WATER USE

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GENERAL

A rapid increase in water utilization has occurred in the Kitsap report area during the past few decades, primarily as a result of an accelerated population growth rate. The demand has decreased available supplies in some areas to the extent that several major surface-water sources have been closed to further appropriation. Since much of the area has undergone extensive urbanization, the trend in water use has been primarily toward development of domestic, community domestic, and municipal water supply systems. Water for irrigation, though significant, is of secondary importance in this area.

WATER RIGHTS AND WATER LAW

Since the water use discussion which follows is based primarily on the water-right records of the Division of Water Resources, it is only proper to first present a brief description of the evolution of our Washington State Water Code and the manner in which water rights are established.

Under Article XXI of our State Constitution, it is provided that water for irrigation, mining, and manufacturing, shall be deemed a public use. The procedure for appropriating these public waters was provided soon thereafter under Chapter CXLII, Session Laws of 1891. Under this statute, rights to the use of the surface waters of the state could be acquired by posting a notice in writing at a conspicuous place at the point of intended diversion, and filing a copy of the notice with the county auditor of the county in which the notice was posted. Through compliance with the specific provisions of this act and the development and use of the waters in question, rights were established with a date of priority which related to the date of the posting of the notice. However, this procedure proved to be inadequate since no supervisory agency had been created to assure compliance with the provisions of the act. Therefore, numerous filings were made whereby the notice was posted at the intended point of diversion and a copy was filed with the local auditor but no actual diversion was made. Thus, the appropriation was never consummated and the actual right never established. However, due to the lack of records, it was not known, without considerable investigation and litigation, as to which filings had been perfected.

Through the years many conflicts arose over rights to the use of public waters and in about 1913 the governor was petitioned to compile a water code for the state. As a result, a commission was formed which drafted a code of some 44 sections which was passed into law by the legislature as Chapter 117, Laws of 1917.

Chapter 117, Laws of 1917, became effective June 6, 1917, and has become known as the Surface Water Code. This code extended the concept of rights by appropriation by declaring that subject to existing rights, all waters within the state belong to the public and any right thereto, or to the use thereof, could only be acquired by appropriation for a beneficial use as provided in the act. Although the code provided that as between appropriations the first in time shall be the first in right, it further declared that nothing in the act shall lessen, enlarge, or modify the rights of riparian owners existing as of June 6, 1917, or any right however acquired, existing as of that date. The act created the office of Hydraulic Engineer to administer these laws and the basic concept of the laws has not been changed through the 43 years of their existence. However, the office of the Hydraulic Engineer has, by law, become a division of the Department of Conservation and the duties of administration now fall upon the Supervisor, Division of Water Resources, of that department.

Since the code recognized rights which existed at the time it became effective, a procedure was established whereby the extent and priority of said rights could be determined. This procedure involves the adjudication of all rights on a certain stream or water course through a hearing in the superior court of the county in which the major part of the stream is located. Normally, the supervisor of the Division of Water Resources acts as referee, conducting the hearing and taking evidence for the court. Upon conclusion of the hearing a report is prepared by the referee whereby a schedule of rights is presented, setting forth the priority and extent of the rights of each claimant. If adopted by the court, this report then becomes a decree in the case and title to all rights on the stream are determined. It should be noted that this action is only required to establish the validity and extent of rights claimed by use prior to 1917.

Where an appropriation is to be initiated after June 6, 1917, the code provides that application must be made to the supervisor for a permit to make the appropriation and that no use or diversion of water shall be made until a permit has been issued. Applications to appropriate public waters must be submitted on forms supplied by the supervisor. When received in the office of the supervisor, the date and time of receipt is endorsed thereon and this date establishes the priority of the application. After office review of the application, a notice for publication is prepared and forwarded to the applicant together with instructions for publication. It is a statutory requirement that this notice appear once a week for two consecutive weeks in a newspaper of general circulation published in the county, or counties, in which the storage or diversion is to be made. A period of thirty days from last date of publication is then provided as a protest period during which formal objections to the approval of the application may be recorded. At this time, notice of the application is also forwarded to the State Department of Fisheries and the State Department of Game and no formal action on the application is taken until such time as the recommendations of those departments are received. Following due notice to the public, a field investigation is conducted by a representative of the Division of Water Resources to determine what water, if any, is available for appropriation and to determine to what beneficial use or uses it can be applied. After full review of the application, written findings of fact are prepared concerning all aspects of the application. If it is found that there is water available for appropriation in the proposed source of supply, and that the proposed use will not conflict with existing rights, or, threaten to prove detrimental to the public interest having due regard to the highest feasible development of the use of the waters belonging to the public, the application may be approved.

Approval of the application and issuance of permit constitutes authority for the commencement of actual construction work which will lead to use of the waters in question. For small projects it is normally specified that construction shall be started within one year from the date of issuance of permit, shall be completed in the second year, and full beneficial use of the waters shall be made in the third year. If in good faith, this schedule cannot be met, extensions of time are granted upon request. This permit may be considered as an agreement between the permittee and the supervisor for the development and use of the waters in accordance with the terms of the permit. Once the water has been put to beneficial use, the permittee may acquire a certificate of water right. However, since it is a fundamental concept of our water laws that an appropriation does not extend in a legal sense to any water except that used beneficially, the certificate of water right issues only for that quantity of water actually used and for the purposes to which the water has been beneficially applied within the maximum limits set by the permit. Should a permittee fail to comply with the conditions of the permit, he is notified by certified mail that he has sixty days in which to show cause why his permit should not be cancelled. If the permittee does not show cause, the permit is cancelled without further notice.

With issuance of the final certificate of water right, processing of the application and permit is completed. Through the certificate, title to the water in question is acquired and the actual water right is perfected. The right acquired by this appropriation becomes an appurtenance to the property described therein as the place of use with the date of priority relating to the original date of filing of the application in the office of the supervisor. Since no provision exists in the present surface water code for the revoking of such certificates, perpetual rights are established.

Whenever storage of water is contemplated, either within the stream channel or adjacent thereto, a storage permit may be required. Normally such a permit is to be obtained whenever the dam or dike will store water to a depth of ten feet or more at its deepest point, or ten acre-feet or more of water will be retained. Furthermore, the surface-water code provides that whenever it is proposed to construct any dam or controlling works for the storage of ten acre-feet or more of water, detailed plans and specifications of the structure must be submitted to the supervisor for his examination and approval as to safety before construction is started. The supervisor requires that such plans and specifications be prepared by a qualified registered professional engineer and carry his signature and seal. Applications for reservoir permit must be made on forms supplied by the supervisor and the procedure for processing of such applications is the same as described under applications for appropriation permit.

Since development and use of public ground waters of the state took place at a slower rate than the surface waters, the need for regulatory control evolved at a later date. However, with improvement of drilling techniques and the expansion of the industrial, municipal and irrigation requirements of the state, the need for laws relating to the appropriation and use of ground water became evident. In 1945 the Association of Washington Cities sponsored and assisted in drafting legislation which is now referred to as the Washington State Ground Water Code.

The laws relating to ground water supplement the surface-water code of the state and were enacted for the purpose of extending the application of the surface-water statutes to the appropriation of ground waters for beneficial use. Thus, the laws are administered by the Division of Water Resources and the appropriation procedure is essentially the same. Basically, the law provides that no withdrawal of public ground waters shall be begun, nor shall any well or works for such withdrawal be constructed unless an application to appropriate such waters has been made to the supervisor and a permit has been granted by him. However, it is further provided that for any withdrawal of public ground waters for stock water purposes, or for watering of a lawn, or of a non-commercial garden not exceeding one-half acre in area, or for single or group domestic uses, or for an industrial purpose, and in an amount not exceeding 5,000 gallons per day, a permit is not required from the supervisor. Applications may be submitted for these purposes if any person or agency wishes to record the well and the use made thereof.

In much the same manner as the surface-water code of 1917, the ground-water code recognizes existing rights established by development and use of ground waters prior to the effective date of the code, June 6, 1945. However, the ground-water code differed in that a declaratory period was provided whereby wells developed prior to 1945 could be recorded. The code provided that any person claiming a vested right for the withdrawal of public ground waters by virtue of prior beneficial use, could within three years after June 6, 1945, receive from the supervisor a certificate of ground-water right to that effect, upon declaration by the claimant in a form prescribed by the supervisor. This declaratory period was subsequently extended for a period of two years such that a total of five years was allowed in which a certificate could be acquired under declarations of claim.

Previous investigations of claims to vested surface water rights in other areas indicated, generally, that only a few of the original filings recorded in the various county auditor's offices prior to 1917 were actually developed and in present use. Since in all cases adjudication proceedings would be required to establish the extent and validity of any such claims to rights, it was decided that a lengthy search of this nature would be unwarranted for the streams included in this report.

It is probable that many instances occur in the area where diversions were initiated prior to June 6, 1917, and no recording was made with the local county auditor. However, since the 1917 act recognized all existing rights, the courts have subsequently held that if water was diverted and applied to a beneficial use prior to 1917, and the use has been continuous through the years, the use has ripened into a valid right regardless of whether or not a recording was made with the auditor. Again, adjudication proceedings would be required to quiet title to such claim to vested right.

In the consideration of all water rights, continuity of use is important. If it is found through adjudication proceedings or quiet title action that a surface-water right has not been used for a long period of time, the courts may rule that the right has been abandoned. In the event that the supervisor of water resources shall find that the withdrawal and use of ground water under a claimed or valid ground-water right has been discontinued for a period of 5 years, he may presume such rights to have been abandoned.

WATER APPROPRIATION

A compilation of records on file with the Division of Water Resources disclosed that there were a total of 1101 active water-right filings in the report area through the year 1962 in the form of applications, permits, and certificates (see p. 166). Of the total, 966 surface-water filings were recorded for a total appropriation of 219.37 cubic feet per second and 135 ground-water filings for 17,849.55 gallons per minute or 39.77 cubic feet per second.

Total surface-water quantities appropriated in selected individual stream basins and groups of stream basins are tabulated by use in table 62. Since many streams in this tabulation are unnamed, each stream, for easier reference, is followed by its corresponding stream number in parenthesis. The stream numbering system is described in the surface-water section (page 60) and the location of each well-defined drainage is shown on plate 3. Filings on the smaller stream systems are grouped together by general geographic location and are referred to by stream numbers.

In the past it was common practice to issue surface-water rights for multiple use only in terms of the total rate of diversion. Consequently, for purposes of table 62, such total quantities were broken down into separate quantities for each use according to water duty criteria currently in effect by the Division of Water Resources. In each of these cases where a multiple use was indicated, the consumptive uses were established first in order of their priority (public and domestic, stock, irrigation and other) and the remaining quantity was assigned to non-consumptive uses. To provide a synoptic picture of table 62, the apportionment by use of all surface waters authorized for appropriation within the report area is diagramatically shown in figure 92.

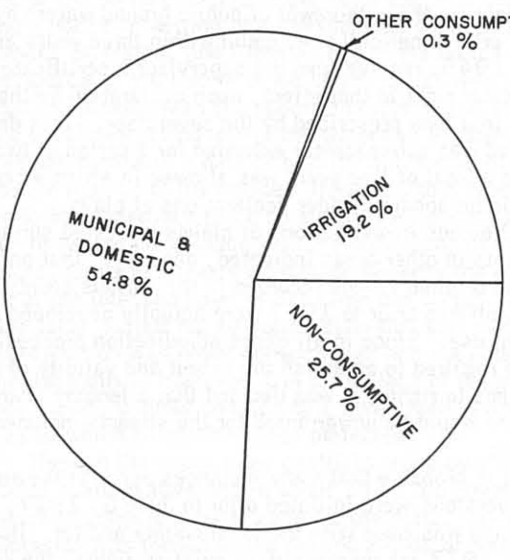

Figure 92. AUTHORIZED SURFACE-WATER USE IN STUDY AREA.
219.37 cfs = 100%

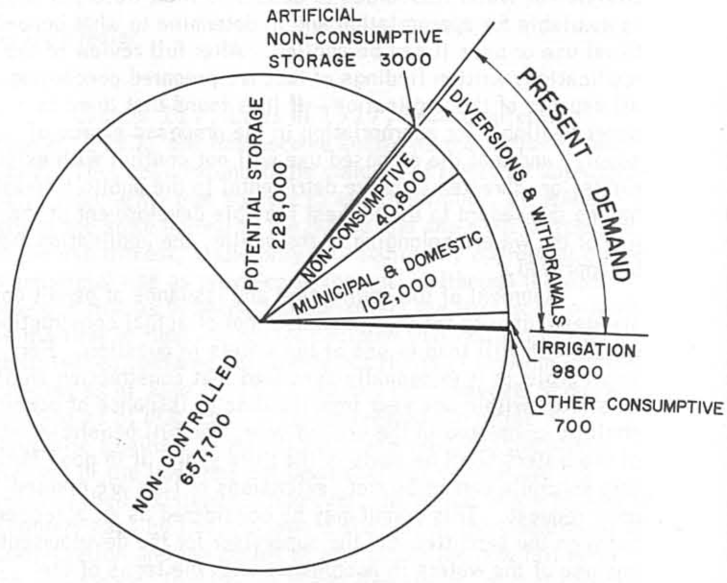

Figure 93. PRESENT AND POTENTIAL USE OF REPORT AREA MEAN ANNUAL YIELD IN ACRE-FEET PER YEAR. TOTAL ESTIMATED MEAN ANNUAL YIELD = 1,042,000 ACRE-FEET.

Using procedures discussed in the surface-water section, the land masses in the report area were estimated to yield an average of about 1,042,000 acre-feet of water per year (1946-60 data). The maximum annual consumptive demand, as established by existing surface-water and ground-water filings, amounts to about 112,500 acre-feet per year. Part of the remaining 929,500 acre-feet is used to recharge depleted soil moisture and surface-water and ground-water storage, but most of this quantity runs off into Puget Sound. As set forth in the section on water development sites, if all the sites examined were developed to their maximum potential, an additional 228,000 acre-feet of storage could be provided. In addition to large quantities of relatively unused water stored in natural lakes, there is at present approximately 3000 acre-feet of water in artifically created surface storage which is used only for non-consumptive purposes. As defined in the preceeding paragraph, filings for non-consumptive uses allow a maximum total diversion of 40,800 acre-feet of water each year. Figure 93 diagramatically shows the above quantities and how they compare with the estimated total mean annual yield. Assuming that the estimated total additional surface storage could be developed, about two-thirds of the mean annual yield or approximately 657,700 acre-feet would still remain uncontrolled.

Water use as presented in figure 93 is very general and oversimplifies a very complex set of conditions. The figure for annual yield is based upon an estimate of the mean for a specific period (1946-60) and could be expected to exhibit

Table 62. SUMMARY OF SURFACE-WATER USE.

Drainage basin (Stream No.)	Total No. of valid filings	No. of irrigation filings	Irrigation acreage	Irrigation quantity (cfs)	Public & domestic quantity (cfs)	Other consumptive quantity (cfs)	Non-consumptive quantity (cfs)	Total appropriated quantity (cfs)
KITSAP PENINSULA								
Sweetwater Creek (4)	5	3	10	0.10	0.10	0	0.78	0.98
Union River (7)	67	25	228	2.215	41.025	0.19	2.18	45.61
Mission Creek (12)	4	0	0	0	5.03	0	0.50	5.53
Little Mission Creek (13)	6	4	24	0.31	0.08	0	0.09	0.48
Johnson Creek (15)	2	0	0	0	0.12	0	0	0.12
Stimson Creek (18)	1	0	0	0	0.25	0	0	0.25
Tahuya River (44)	10	3	47	0.47	30.04	0	1.69	32.20
Caldervin Creek (46)	1	1	5	0.05	0.29	0	0	0.34
All drainages from Stream No. 1 to 60, inclusive, not listed above.	68	8	20	0.31	2.513	0	0.59	3.413
Dewatto Creek (70)	2	2	32	0.31	0.02	0	0	0.33
All drainages from Stream No. 61 to 116, inclusive, not listed above.	16	4	13	0.10	0.72	0	0.32	1.14
Seabeck Creek (117)	3	2	3	0.03	0.02	0	0	0.05
Big Beef Creek (121)	4	0	0	0	0.06	0	5.05	5.11
Johnson Creek (123)	2	0	0	0	0.01	0	0.25	0.26
Anderson Creek (124)	1	1	15	0.15	0	0	0	0.15
Jump-off Creek (146)	2	1	2	0	0.01	0	0.50	0.51
Unnamed Stream (149)	10	8	113	1.19	0.07	0	0	1.26
Fern Creek (150)	4	3	2.5	0.03	0.04	0	0	0.07
Gamble Creek (158)	10	9	76	0.82	0.08	0.01	0	0.91
All drainages from Stream No. 117 to 167, inclusive, not listed above.	22	15	39.5	0.284	0.24	0	0.59	1.114
Finland Creek (169)	6	4	42	0.35	0.04	0.02	0.02	0.43
Carpenter Lake Drainage (181)	6	4	32	0.32	0.03	0	0.09	0.44
Unnamed Stream (184)	4	3	80	0.495	0.02	0.005	0	0.52
Unnamed Stream (189)	4	3	7	0.07	0.04	0	0	0.11
Grovers Creek (192)	7	7	31	0.285	0.05	0	0	0.335
Unnamed Stream (202)	4	3	21	0.19	0.03	0.01	0	0.23
All drainages from Stream No. 168 to 206, inclusive, not listed above.	32	19	130.5	1.325	0.537	0.02	0.15	2.032
Dogfish Creek (207)	26	20	259	2.30	2.48	0.02	0.10	4.90
Johnson Creek (208)	7	3	24	0.26	0.14	0.01	1.21	1.62
Scandia Creek (213)	8	3	12	0.12	1.05	0	0	1.17
Steel Creek (223)	16	8	105	0.93	0.08	0	0.64	1.65
Illahee Creek (228)	4	2	27	0.03	0.33	0	0.20	0.56
Mosher Creek (241)	3	3	19	0.15	0.02	0	0	0.17
Barker Creek (245)	12	9	98	0.88	0.07	0.01	0.68	1.64
All drainages from Stream No. 207 to 245, inclusive, not listed above.	42	17	73.5	0.84	1.29	0.02	0.40	2.55
Clear Creek (246)	8	6	78	0.72	0,05	0	0.30	1.07
Woods Creek (251)	9	1	1	0.01	1.74	0	0.50	2.25
Unnamed Stream (252)	5	0	0	0	0.48	0	0	0.48
Chico Creek (259)	33	12	38.75	0.475	21.03	0	0.632	22.137
All drainages from Stream No. 246 to 267, inclusive, not listed above.	22	10	46	0.40	0.68	0.11	4.20	5.39
Gorst Creek (268)	5	5	17	0.14	0.06	0.01	0.03	0.24
Unnamed Stream (269)	6	4	13	0.13	0.07	0	0.05	0.25
Blackjack Creek (279)	25	22	438.5	3.80	0.12	0.02	0.13	4.07
Sullivan Creek (285)	4	4	39	0.36	0.02	0	0	0.38
Beaver Creek (289)	6	2	9	0.09	0.04	0.01	5.12	5.26
Curley Creek (294)	34	25	285	1.99	0.22	0	0.92	3.13
Wilson Creek (297)	5	4	12	0.07	0.04	0	0.04	0.15
All drainages from Stream No. 268 to 303, inclusive, not listed above.	31	19	60.25	0.71	0.75	0	0.43	1.89

Table 62. SUMMARY OF SURFACE-WATER USE. (Continued)

Drainage basin (Stream No.)	Total No. of valid filings	No. of irrigation filings	Irrigation acreage	Irrigation quantity (cfs)	Public & domestic quantity (cfs)	Other consumptive quantity (cfs)	Non-consumptive quantity (cfs)	Total appropriated quantity (cfs)
KITSAP PENINSULA (continued)								
Big Phinney Creek (308)	8	4	15	0.15	0.08	0.01	0.25	0.49
Olalla Creek (313)	16	15	105.5	1.01	0.04	0.01	0	1.06
Crescent Creek (321)	5	5	31	0.34	0.03	0	0	0.37
Unnamed Stream (342)	6	4	90	0.76	0.02	0	0	0.78
McCormick Creek (350)	5	2	52	0.53	0.13	0	0.10	0.76
Purdy Creek (354)	6	4	24	0.235	0.04	0	0.25	0.525
All drainages from Stream No. 304 to 355, inclusive, not listed above.	40	15	165	1.49	0.995	0.02	0.41	2.915
Burley Creek (356)	20	16	307	2.62	0.10	0	0.53	3.25
Minter Creek (367)	11	5	67	0.67	0.13	0	21.73	22.53
Coulter Creek (425)	3	2	22	0.14	0.02	0	0	0.16
All drainages from Stream No. 356 to 426, inclusive, not listed above.	50	31	277	2.92	0.42	0	2.75	6.09
TOTAL - Kitsap Peninsula	784	414	3,784	34.674	114.23	0.505	54.402	203.811
BAINBRIDGE ISLAND								
Unnamed Stream (461)	7	7	87	0.66	0.01	0	0	0.67
Unnamed Stream (463)	6	6	91.25	0.93	0	0	0	0.93
All drainages from Stream No. 427 to 464, inclusive, not listed above	28	19	236.08	1.76	1.42	0	0	3.18
TOTAL - Bainbridge Island	41	32	414.33	3.35	1.43	0	0	4.78
VASHON AND MAURY ISLANDS								
Beall Creek (479)	3	2	17.5	0.575	0.91	0	0	1.485
Ellis Creek (482)	2	1	1	0.01	0.51	0	0.13	0.65
Unnamed Stream (483)	2	0	0	0	0.51	0	0	0.51
Judd Creek (510)	16	7	79	0.73	0.105	0.05	0.05	0.935
Fisher Creek (514)	9	6	48	0.48	0.16	0	0.04	0.68
Tahlequah Creek (518)	5	0	0	0	0.05	0	0	0.05
Jod Creek (530)	3	3	24	0.24	0.03	0	0.50	0.77
Green Valley Creek (531)	4	3	6	0.17	0.04	0	0	0.21
Unnamed Stream (535)	5	0	0	0	0.09	0	0.025	0.115
Needle Creek (540)	6	4	16.5	0.535	0.09	0.005	0.25	0.88
All drainages from Stream No. 465 to 547, inclusive, not listed above	68	17	94.25	0.864	1.395	0.01	0.24	2.509
TOTAL - Vashon and Maury Islands	123	43	286.25	3.604	3.890	0.065	1.235	8.794
FOX ISLAND								
All drainages from Stream No. 548 to 555, inclusive.	9	4	11	0.16	0.57	0	0	0.73

Table 62. SUMMARY OF SURFACE-WATER USE. (Continued)

Drainage basin (Stream No.)	Total No. of valid filings	No. of irrigation filings	Irrigation acreage	Irrigation quantity (cfs)	Public & domestic quantity (cfs)	Other consumptive quantity (cfs)	Non-consumptive quantity (cfs)	Total appropriated quantity (cfs)
MCNEIL ISLAND								
All drainages from Stream No. 556 to 559, inclusive.	1	1	1	0.01	0.01	0	0.88	0.90
ANDERSON ISLAND								
Unnamed Stream (570)	3	2	25	0.24	0.02	0.01	0	0.27
All drainages from Stream No. 560 to 582, inclusive, not listed above.	5	1	5	0.04	0.045	0	0	0.085
TOTAL - Anderson Island	8	3	30	0.28	0.065	0.01	0	0.355
GRAND TOTAL - Report Area	966	497	4,526.58	42.078	120.195	0.580	56.517	219.370

Table 63. ACREAGE COVERED BY GROUND-WATER AND SURFACE-WATER IRRIGATION IN THE KITSAP REPORT AREA.

Drainage basin (Stream No.)	Ground water	Surface water	Total irrigated acreage
KITSAP PENINSULA			
Sweetwater Creek (4)	0	10	10
Union River (7)	0	228	228
Little Mission Creek (13)	0	24	24
Tahuya River (44)	0	47	47
Caldervin Creek (46)	0	5	5
All drainages from Stream No. 1 to 60, inclusive, not listed above	0	20	20
Dewatto Creek (70)	0	32	32
All drainages from Stream No. 61 to 116, inclusive, not listed above	0	13	13
Seabeck Creek (117)	0	3	3
Anderson Creek (124)	0	15	15
Jump-off Creek (146)	0	2	2
Unnamed Stream (149)	0	113	113
Fern Creek (150)	0	2.5	2.5
Gamble Creek (158)	0	76	76
All drainages from Stream No. 117 to 167, inclusive, not listed above.	1.5	39.5	41
Finland Creek (169)	0	42	42
Carpenter Lake Drainage (181)	0	32	32
Unnamed Stream (184)	0	80	80
Unnamed Stream (189)	0	7	7
Grovers Creek (192)	0	31	31
Unnamed Stream (202)	0	21	21
All drainages from Stream No. 168 to 206, inclusive, not listed above	109	130.5	239.5
Dogfish Creek (207)	45	259	304
Johnson Creek (208)	0	24	24
Scandia Creek (213)	0	12	12
Steel Creek (223)	18	105	123
Illahee Creek (228)	0	27	27
Mosher Creek (241)	0	19	19
Barker Creek (245)	15	98	113
All drainages from Stream No. 207 to 245, inclusive, not listed above	8.5	73.5	82
Clear Creek (246)	0	78	78
Woods Creek (251)	0	1	1
Chico Creek (259)	0	38.75	38.75
All drainages from Stream No. 246 to 267, inclusive, not listed above	5	46	51
Gorst Creek (268)	0	17	17
Unnamed Stream (269)	0	13	13
Blackjack Creek (279)	0	438.5	438.5
Sullivan Creek (285)	2	39	41
Beaver Creek (289)	0	9	9
Curley Creek (294)	0	285	285
Wilson Creek (297)	0	12	12
All drainages from Stream No. 268 to 303 inclusive, not listed above	2	60.25	62.25
Big Phinney Creek (308)	0	15	15
Olalla Creek (313)	0	105.5	105.5
Crescent Creek (321)	0	31	31
Unnamed Stream (342)	0	90	90
McCormick Creek (350)	0	52	52
Purdy Creek (354)	0	24	24
All drainages from Stream No. 304 to 355, inclusive, not listed above	18	165	183

Table 63. ACREAGE COVERED BY GROUND-WATER AND SURFACE-WATER IRRIGATION IN THE KITSAP REPORT AREA. (continued)

Drainage basin (Stream No.)	Ground water	Surface water	Total irrigated acreage
KITSAP PENINSULA (continued)			
Burley Creek (356)	8	307	315
Minter Creek (367)	49	67	116
Coulter Creek (425)	0	22	22
All drainages from Stream No. 356 to 426, inclusive, not listed above	18	277	295
TOTAL - Kitsap Peninsula	299	3,784	4,083
BAINBRIDGE ISLAND			
Unnamed Stream (461)	25	87	112
Unnamed Stream (463)	0	91.25	91.25
All drainages from Stream No. 427 to 464, inclusive, not listed above	0	236.08	236.08
TOTAL - Bainbridge Island	25	414.33	439.33
VASHON AND MAURY ISLANDS			
Beall Creek (479)	0	17.5	17.5
Ellis Creek (482)	0	1	1
Judd Creek (510)	0	79	79
Fisher Creek (514)	40	48	88
Jod Creek (530)	0	24	24
Green Valley Creek (531)	0	6	6
Needle Creek (540)	0	16.5	16.5
All drainages from Stream No. 465 to 547, inclusive, not listed above	24	94.25	118.25
TOTAL - Vashon and Maury Islands	64	286.25	350.25
FOX ISLAND			
All drainages from Stream No. 548 to 555, inclusive	0	11	11
McNEIL ISLAND			
All drainages from Stream No. 556 to 559, inclusive	0	1	1
ANDERSON ISLAND			
Unnamed Stream (570)	0	25	25
All drainages from Stream No. 560 to 582, inclusive, not listed above	0	5	5
TOTAL - Anderson Island	0	30	30
GRAND TOTAL - Report Area	388	4,526.58	4,914.58

variations of the order expressed by the coefficients of variation in table 49 (Variation of Measured Annual Runoff). The figure for consumptive demand assumes that the only use of water is by holders of valid water-right filings recorded with the State Division of Water Resources and that each right is being fully utilized. Also, detailed engineering, geologic and economic studies would be required for each site before the figure for potential storage could be justified. Though it is physically and economically possible to utilize some of the runoff water that is presently being lost, a large amount occurring as direct ground-water discharge to the waters of Puget Sound will always be non-recoverable. Increased utilization of ground water, however, would tend to reduce the amount of non-recoverable ground water.

Table 62 and figures 92 and 93 all show that most of the appropriated water is used for public and domestic water supplies. Additional information about municipal, community, and group water systems is provided in appendix B.

The next largest use is for irrigation. Table 63 lists by drainage basin the acreage covered by existing ground-water and surface-water rights and totals for specific portions of the report area. Other important uses are covered in the following discussions of individual basins.

In general, the need for public supplies and domestic water is dictated by local population intensity; whereas, the demand for irrigation water is significantly greater in the northern and eastern parts of the area where recharge from precipitation is least.

Individual water-right filings used in the compilation and construction of the foregoing figures and tables are found in appendices C and D. Township plats are provided in appendix E to show the location of each surface-water and ground-water filing and to show irrigated areas of 10 acres or more in size.

In the granting of water rights the Division of Water Resources recognizes and respects the needs of fish for the use of surface waters. Several aspects are considered before a permit is issued, such as fish propagation, use in fishways, and the maintenance of sufficient low flows to support fish life. The Departments of Fisheries and Game were consulted to appraise the fishery value of various streams within the study area and information was provided as to the portions of streams utilized by anadromous fish for spawning purposes. These areas are shown on plate 5. Although only the known spawning and migration areas are shown on plate 5 (in red), these streams also benefit fingerlings by providing rearing areas which have suitable food supplies. The length of residence each specie spends in fresh-water streams prior to their migration to the sea varies from about three months to a year.

The Departments of Fisheries and Game have requested that the 14 streams listed in table 64 be closed to further consumptive water-right appropriations in the interest of protection to the fishery of these streams. This closure does not apply to domestic or stock water diversions. Occasionally, streams closed for the purposes stated above may be reappraised and reopened to appropriation.

Appropriation from some streams may be permitted with certain low-flow provisions, and diversions will be restricted to periods when the flow of the streams exceeds those established low flows. In the report area, the Union River and Dogfish Creek are the only streams subject to this type of restriction and these are outlined in table 65. In addition to low-flow restrictions, Dogfish Creek is one of the streams closed to further appropriation. Streams not listed in either tables 64 or 65 are still open to appropriation.

Table 64. STREAMS CLOSED TO FURTHER APPROPRIATION.

Barker Creek - tributary Dyes Inlet
Bear Creek - tributary Burley Creek
Blackjack Creek - tributary Sinclair Inlet
Burley Creek - tributary Burley Lagoon
Clear Creek - tributary Dyes Inlet
Dogfish Creek - tributary Liberty Bay
Dutchers Creek - tributary Case Inlet
Judd Creek - tributary Quartermaster Harbor
Minter Creek - tributary Henderson Bay
Mission Creek - tributary Hood Canal
Salmonberry Creek - tributary Long Lake
Seabeck Creek - tributary Seabeck Bay
Unnamed Stream - tributary Kitsap Lake (Sec. 20, T. 24 N., R. 1 E.)
Wildcat Creek - tributary Chico Creek

Table 65. STREAMS OPEN TO APPROPRIATION, SUBJECT TO DESIGNATED LOW-FLOW RESTRICTIONS.

Union River

Minimum flow - 3 cfs directly below McKenna Falls.
Minimum flow - 5 cfs directly below confluence of East Fork Union River.
Minimum flow - 8 cfs at former gaging station location near Belfair (0635) in Sec. 20, T. 23 N., R. 1 W.
Minimum flow - 10 cfs at mouth in SW¼ Sec. 29, T. 23 N., R. 1 W.

Dogfish Creek

Minimum flow - 0.5 cfs on East Fork above confluence with West Fork.
Minimum flow - 1 cfs on main stem of Dogfish Creek below confluence of East and West Forks.

The following paragraphs deal with present water use in certain selected basins within the report area. These discussions, based on tables 62 and 63 and appendices C, D, and E, are intended to present only a brief resume' of use by basin. More detailed facts and figures relating to low flows have been discussed and are tabulated in the section of this report dealing with surface-water resources.

UNION RIVER (7)

More water-right filings have been made on the Union River and its tributaries than any other stream system in the report area. As of January 1, 1963, there were 67 valid surface-water filings for a total of 45.61 cfs. Of this total, 43.43 cfs were for consumptive uses.

In accordance with the trend of water use in this area, most of the consumptive quantity (41.025 cfs) was for public and domestic water supply systems. The city of Bremerton controls nearly all of this amount for its municipal supply and has rights to divert a total of 40.00 cfs from the Union River proper, the West Fork of the Union River and Lesco Creek. In support of these diversions, the city holds two reservoir certificates to store 4000 acre-feet of water in the Union River Reservoir (Casad Dam) and 1200 acre-feet in Twin Lakes. This system was discussed in the Surface-Water Resources section under Water Development Sites.

Excepting lawn and garden irrigation of one acre or less, 2.215 cfs have been appropriated from surface-water sources in the Union River basin for the irrigation of 228 acres of land. This water is used primarily to improve pasturage during dry summer months.

A small water-wheel utilizes 1.02 cfs of the non-consumptive quantity appropriated in this basin while the remainder is primarily for fish propagation and beautification.

Since water rights have been issued for a large part of this stream's runoff, the Departments of Game and Fisheries have requested low-flow restrictions on further appropriations. These restrictions, listed in table 65, are designed to maintain certain specified minimum flows in the river at all times for the preservation of the stream's fishery resource. Though surface-water filings are numerous in the Union River basin, there are no valid ground-water filings on record with the Division of Water Resources.

MISSION CREEK (12)

Prior to 1963 there were 4 valid surface-water filings in Mission Creek basin for a total of 5.53 cfs; however, 5.00 cfs of the total may never be put to beneficial use. The City of Bremerton, in 1950, submitted an application for this amount to augment their municipal supply, but a permit has never been issued because of protests by the Departments of Fisheries and Game. Excepting the 5.00 cfs, only 0.03 cfs have been appropriated from Mission Creek for consumptive purposes and the remaining 0.50 cfs is used for fish propagation.

In addition to existing storage in Mission and Tiger Lakes, topography in Mission Creek basin indicates that it may be possible to develop up to 9500 acre-feet of storage by constructing a dam between 2 and 3 miles upstream from the mouth of this stream (see section on Water Development Sites).

One valid ground-water filing exists within the basin. This is held by the Washington State Department of Institutions for a community domestic supply, and is limited to an annual withdrawal of 240 acre-feet.

TAHUYA RIVER (44)

As of January 1, 1963, there were 10 valid surface-water filings on the Tahuya River and its tributaries. These filings were for a total diversion of 32.20 cfs but permits have actually been issued for only 2.20 cfs. In 1950 the City of Bremerton applied for 20.00 cfs to increase its municipal supply, but quality problems and protests by the Departments of Fisheries and Game have deterred development. Kitsap County P.U.D. No. 1 in 1960 submitted an application for 10.00 cfs from Gold Creek, but this also has drawn objections from the aforementioned State Departments.

A total of 0.47 cfs has been appropriated in the Tahuya River basin under 3 surface-water rights to irrigate 47 acres of land. Individual domestic supplies account for most of the remaining consumptive use and 1.69 cfs is used in a small mining operation.

Two reservoir applications are on file to store water in the Tahuya River basin. One was submitted in 1960 by the Kitsap County P.U.D. No. 1 and is to store 1000 acre-feet of water near the source of Gold Creek. The other was filed in 1961 to enlarge Tahuya Lake and increase its storage capacity to about 1650 acre-feet (see Section on Water Development Sites).

Ground-water resources are virtually untapped in the Tahuya River basin as no valid ground-water filings are of record.

DEWATTO CREEK (70)

Although it is one of the larger drainages in the report area, comparatively little use is made of the water resources of Dewatto Creek basin. Only two surface-water rights have been established in this area and neither involve diversions from the main stem. In all, 0.31 cfs has been allocated for irrigation purposes and 0.02 cfs for domestic supplies.

Throughout the southwestern part of the Kitsap Peninsula there has been little ground-water development and no valid ground-water filings exist within the area drained by Dewatto Creek.

BIG BEEF CREEK (121)

Two surface-water filings for domestic supplies account for the small total consumptive use of 0.06 cfs in this basin; however, a sizable quantity has been appropriated for non-consumptive purposes. In 1961, filings were submitted to appropriate 5.00 cfs and to store 800 acre-feet in a reservoir on Big Beef Creek near the community of Camp Union. The artificial lake created by this project would be used primarily for recreational purposes in conjunction with a lake-shore real estate development. No valid ground-water filings exist in this watershed.

UNNAMED STREAM (149)

This stream drains the northerly end of Big Valley and is primarily utilized as a source for irrigation water. As of January 1, 1963, a total of 10 valid surface-water filings were on record, of which 8 were for irrigation use. These 8 filings permit a total diversion of 1.19 cfs to irrigate 113 acres of land. Also, 0.07 cfs has been allocated for individual domestic supplies. No ground-water rights have been established in this basin.

GAMBLE CREEK (158)

Similar to most other streams that drain the northern part of the Kitsap Peninsula, Gamble Creek is used primarily as a source for irrigation water. Within the basin 9 valid filings have been established for this use permitting a total diversion of 0.82 cfs to irrigate 76 acres of land.

Of the 10 filings on this stream system, 5 include domestic supply as a use and permit a total of 0.08 cfs to be diverted for this purpose. Stock water accounts for an additional 0.01 cfs. One right for 0.10 cfs employs the water non-consumptively for fish propagation before it is used for domestic supply and irrigation. One ground-water right for 100 gpm has been recorded to irrigate 34 acres of land near the headwaters of Gamble Creek.

A cursory examination of the Gamble Creek basin indicates that it may be possible to construct a sizable reservoir near its mouth. Such a reservoir could help to meet the relatively high demand for irrigation water in this area.

DOGFISH CREEK (207)

From the standpoint of water use, Dogfish Creek is probably the most important stream in the northern part of the report area. As of January 1, 1963, 26 valid surface-water filings were on record for this basin. These provide for an aggregate diversion of 4.90 cfs of which only 0.10 cfs was allocated for non-consumptive use.

The Town of Poulsbo has developed several springs in the Dogfish Creek drainage for its municipal supply and holds 3 surface-water certificates allowing a total diversion of 2.40 cfs. In addition, several individual domestic and stock-water supplies amounting to 0.10 cfs are derived from the stream system. Agriculture is well developed in this area and 20 filings for a total of 2.30 cfs were on record to irrigate 259 acres of land.

Controversies have developed in the past over the use of Dogfish Creek waters and at times the demand has been excessive. The Departments of Fisheries and Game have therefore requested that no further appropriations be authorized from this source. Existing filings are subject to low-flow restrictions (tables 64 and 65).

Three ground-water filings have been established within the area drained by Dogfish Creek. These are primarily for irrigation use and permit a total rate of withdrawal of 275 gpm to irrigate 45 acres. Domestic use is also permitted under two of the filings. The total annual withdrawal under all of the filings is limited to 95.6 acre-feet.

JOHNSON CREEK (208)

Approximately 75 percent of the surface waters appropriated in the Johnson Creek drainage are used for non-consumptive purposes. Two rights totaling 1.03 cfs have been established for fish culture and 0.18 cfs under another right has been allocated for the operation of hydraulic rams.

Consumptive use diversions total 0.41 cfs. Three filings permit the diversion of 0.26 cfs to irrigate 47 acres, 0.14 cfs has been appropriated for domestic supplies, and 0.01 cfs is permitted for stock watering purposes. No valid ground-water filings were on record for the Johnson Creek drainage prior to 1963.

SCANDIA CREEK (213)

Though the Scandia Creek drainage is quite small, it is important because it is the source of the domestic supply for the community of Scandia. A total of 1.00 cfs has been appropriated for this use under two separate filings by the Scandia Waterworks Co. In addition to the community system, 0.05 cfs has been appropriated for 4 individual domestic supplies.

Scandia Creek is also used to supply water for the irrigation of 12 acres of land. Three rights have been established for this purpose permitting a total diversion of 0.12 cfs.

Preliminary studies indicate that it might be possible to construct two storage reservoirs on this stream to help meet future demands in the immediate area. The reservoirs, if feasible, would have a combined capacity of approximately 220 acre-feet. As of January 1, 1963, no valid ground-water filings were on record for this basin.

STEEL CREEK (223)

Over one-third of the water appropriated from Steel Creek and its tributaries is devoted to the non-consumptive uses of fish propagation and power production. A total of 0.64 cfs has been appropriated in 4 filings for these purposes. Of this amount, 0.49 cfs has been used under one of the rights for both fish propagation and the operation of a small water turbine. This facility reportedly produces about 2 horsepower.

A total of 1.01 cfs has been appropriated in this basin for consumptive purposes. Eight valid filings amounting to 0.93 cfs were on record for the irrigation of 105 acres of land. The remainder is utilized for domestic purposes.

Two ground-water rights have been established near the headwaters of the Steel Creek drainage. One of the rights was granted for the irrigation of 18 acres of land and both provide for domestic supplies. The combined annual withdrawal under both rights is limited to 46 acre-feet.

Topography indicates that it may be feasible to add approximately 290 acre-feet of surface storage in this basin through the construction of 2 reservoirs.

BARKER CREEK (245)

Over one-third of all the surface waters appropriated in Barker Creek basin are utilized for non-consumptive purposes. A small ram uses 0.13 cfs to furnish domestic water for two homes and 0.55 cfs is allotted for fish propagation.

Consumptive uses from surface-water sources amount to 0.96 cfs. A total of 9 filings have been established for the irrigation of 98 acres of land and these permit a total diversion of 0.88 cfs. Of the 12 valid filings in this drainage, 7 provide for domestic supplies and stock water, and reserve a total of 0.08 cfs.

Because diversions from the Barker Creek system under existing filings have at times produced critical low flows, the Departments of Fisheries and Game have requested that this stream be closed to further consumptive appropriations.

Two ground-water filings permitting a total annual withdrawal of 43.2 acre-feet have been established in this drainage. One of these provides water for the Community of Bucklin Hill and the other is used for irrigation of 15 acres of land.

Island Lake provides natural surface storage in this basin and the reservoir on Barker Creek shown on plate 5, if feasible, would provide an additional 130 acre-feet of storage.

CLEAR CREEK (246)

Agriculture is well developed in the Clear Creek valley; consequently, most of the water appropriated from this stream and its tributaries is used for irrigation. This use is specified in 6 of the 8 valid filings in this basin and under these rights, a total diversion of 0.72 cfs is permitted for use on 78 acres of land.

Domestic rights have been issued in this area for a total of 0.05 cfs, and 0.30 cfs is used to operate hydraulic rams.

It is estimated that about 2000 acre-feet of additional surface-water storage could be provided in this basin by constructing a reservoir on the West Branch of Clear Creek (table 54). The Departments of Fisheries and Game feel that additional diversion from the Clear Creek system would jeopardise its fishery use; therefore, the stream has been closed to further consumptive appropriation.

One ground-water right has been perfected in the southern part of this basin to furnish water for the Community of Bucklin Terrace. This right permits a rate of withdrawal of 20 gpm and a total annual withdrawal of 32 acre-feet.

WOODS CREEK (251)

Woods Creek is a typical example of the many short spring-fed streams found on the Kitsap Peninsula but is of particular importance because it is used to provide a water supply for the Community of Silverdale. Four filings on this stream have been submitted by the Silverdale Water District for a total diversion of 1.56 cfs. Several other domestic systems also use this stream for their supplies and divert an additional 0.18 cfs. One of these filings also provides 0.01 cfs to irrigate 1 acre of land.

The only non-consumptive filing on Woods Creek is for a gravel washing operation. To prevent possible silt problems in the Community of Silverdale water system, none of the 0.50 cfs allowed for the gravel washing operation may be diverted above the Community of Silverdale intake. No ground-water rights have been established in this small drainage.

CHICO CREEK (259)

Of the stream systems in the report area, the Chico Creek drainage ranks third in total number of surface-water filings. As of January 1, 1963, there were 33 valid filings on record for this area.

Since this stream and its tributaries flow through one of the more heavily populated areas of the Kitsap Peninsula, a major part of the appropriated water is used for domestic purposes. Municipal supply, community domestic or individual domestic use is indicated in 31 of the filings which account for a total diversion of 21.03 cfs. Though valid filings exist for this amount, permits have actually been issued for only 1.03 cfs. The Kitsap County P.U.D. No. 1 in 1960, submitted an application to divert 20.00 cfs from Lost Creek for municipal supply; however, the Departments of Fisheries and Game have registered a preliminary protest against approval of a permit.

Irrigation is specified in 12 surface-water filings in the Chico Creek basin. In all, these provide for 0.475 cfs to be diverted for use on 38.75 acres of land.

Non-consumptive uses account for 0.632 cfs. A certificate authorizing 0.25 cfs was perfected in 1938 for sand and gravel washing purposes, but a field examination in 1962 showed that the operation had ceased and no water was being diverted at that time. Two rights utilizing 0.37 cfs provide for the operation of hydraulic rams and 0.012 cfs has been allotted for fish propagation.

Future demands may require the utilization of naturally stored water in Kitsap and Wildcat Lakes and, if feasible, the 3 reservoirs examined for this area (table 54) could provide an additional 5100 acre-feet of artificial storage.

It is interesting to note that the first filing for a ground-water right under the declaration of vested right procedure was submitted from this area. This right, permitting a withdrawal rate of 70 gpm (112 acre-feet annually) for a community domestic supply, was also the only valid ground-water filing in the Chico Creek basin prior to 1963.

GORST CREEK (268)

Though the total diversion permitted under surface-water filings in the Gorst Creek drainage amounts to only 0.24 cfs, important additional use is made of this stream by the City of Bremerton for their municipal supply under a claim to a vested right. Since Gorst Creek was used for this purpose prior to 1917, the City of Bremerton probably enjoys the highest priority right on the stream. Adjudication proceedings would be required, however, before the exact extent and priority of their vested claim could be established.

A total of 5 surface-water filings have been established by other users in this basin and all provide for irrigation, permitting a total diversion of 0.14 cfs for use on 17 acres of land. Domestic use is indicated in 4 of the rights for a total of 0.06 cfs and stockwater in 1 right for 0.01 cfs. Only 0.03 cfs has been allocated for non-consumptive use in the Gorst Creek basin. This quantity is used for power generation.

Two ground-water filings have been established in the Gorst Creek area by the Sunnyslope Water District. These rights were filed for municipal and community domestic supplies and , combined, permit a withdrawal rate of 430 gpm and a total annual withdrawal of 280.6 acre-feet.

BLACKJACK CREEK (279)

Blackjack Creek is one of the more heavily appropriated streams in the report area, and as a result, has been closed to further appropriation at the request of the Departments of Fisheries and Game. In all, 25 valid filings have been recorded for this stream and its tributaries permitting a total diversion of 4.07 cfs.

In contrast to the general trend in the report area, irrigation is the most important water use in the Blackjack Creek drainage. A total of 22 filings have been recorded for this purpose permitting an aggregate diversion of 3.80 cfs for use on 438.5 acres of land. Individual domestic users and livestock utilize 0.14 cfs from the stream system and 0.13 cfs has been appropriated for fish propagation and operating a hydraulic ram.

Although the Blackjack Creek basin is a comparatively good ground-water producing area, only two ground-water rights have been perfected in this area. These rights are for community domestic supplies and permit a total rate of withdrawal of 70 gpm and a total annual withdrawal of 28.75 acre-feet.

In addition to the natural surface storage provided by several small lakes, cursory studies indicate that it may be possible to develop up to 2050 acre-feet of storage through the two proposed reservoirs listed in table 54.

CURLEY CREEK (294)

Curley Creek basin ranks second among individual drainages in the report area in total number of valid surface-water filings. As of January 1, 1963, there were 34 such filings on record for this basin.

Similar to Blackjack Creek basin, agriculture is well developed in the Curley Creek area and most of the larger appropriations are for irrigation purposes. In all, 25 filings provide for a total diversion of 1.99 cfs to be used on 285 acres of land. Filings for domestic use permit a total diversion of 0.22 cfs, and diversion of 0.92 cfs is permitted for several non-consumptive uses.

Long Lake, with a surface area of 314 acres, is the largest natural lake in the report area. In addition to the surface water stored in Long Lake, it may be possible to develop 190 acre-feet of storage on a small tributary stream near the mouth of Curley Creek.

Two ground-water filings have been established in this basin for community domestic and municipal supplies. The combined rate of withdrawal permitted by these filings is 350 gpm and the total annual withdrawal is 571.4 acre-feet.

OLALLA CREEK (313)

The trend in water use found in other nearby drainages is also displayed in the Olalla Creek basin. A total of 16 surface-water filings have been recorded for this area and, of these, 15 include irrigation as a use. Six of the rights provide for irrigation of 10 acres or more, and allow a total appropriation of 1.01 cfs for use on 105.5 acres of land.

Three rights on streams in this drainage allow a total diversion of 0.04 cfs for domestic purposes and 0.01 cfs has been allocated for stock water use. No ground-water filings or non-consumptive surface-water filings exist in this basin.

BURLEY CREEK (356)

A total of 2.62 cfs has been appropriated under 16 filings to irrigate 307 acres of land in the Burley Creek basin. Only in the Blackjack Creek drainage has more surface-water been appropriated for this use. Of the 20 valid filings for the Burley Creek drainage, 9 provide for domestic use and permit a total diversion of 0.10 cfs. Since these filings permit a comparatively heavy draft on the surface-water resources, the Departments of Fisheries and Game have requested that Burley Creek be closed to further consumptive appropriation.

Non-consumptive uses account for 0.53 cfs of the total 3.25 cfs diversion allowed in the basin. These include 0.10 cfs for milk cooling operations, 0.08 cfs for fish propagation, and 0.35 cfs for the operation of hydraulic rams.

Two ground-water rights have been perfected in this area. One permits the use of 50 gpm for a gravel washing operation and is limited to a total annual withdrawal of 20 acre-feet. The other allows 45 gpm to be used for irrigation and domestic purposes and provides for a maximum annual withdrawal of 160 acre-feet.

MINTER CREEK (367)

The State Department of Fisheries maintains a fish hatchery and biological experiment station near the mouth of Minter Creek and holds rights for the use of 20.48 cfs. This quantity is utilized primarily for non-consumptive purposes, which include fish culture and propagation, scientific studies of fish and other marine life, and the operation of fish counting traps. Two other non-consumptive filings in the basin authorize 1.25 cfs for gravel and rock washing operations, and fish propagation.

Within the basin, 5 surface-water rights have been issued for irrigation purposes. These rights utilize a total diversion of 0.67 cfs for 67 acres of land. Domestic use is specified in 8 of the 11 surface-water filings in this area permitting a total diversion of 0.13 cfs. To insure that flows will be sufficient at all times to operate their hatchery, the Department of Fisheries has requested that Minter Creek and its tributaries be closed to further consumptive appropriation.

Prior to 1963, there were 4 ground-water filings in the watershed for community domestic, domestic and irrigation uses. The combined rate of withdrawal under these filings is 471 gpm and 117.6 acre-feet per year.

Small amounts of natural surface storage exist in several small lakes in the basin and preliminary studies indicate that approximately 2800 acre-feet of storage could be added by constructing a dam on the main stem of Minter Creek about a mile west of Horseshoe Lake (pl. 5).

JUDD CREEK (510)

Appropriations from Judd Creek and its tributaries present a fairly representative picture of water use in the island areas of this report. A total of 16 surface-water filings have been recorded for this stream system,which combined, permit the diversion of 0.935 cfs.

Irrigation is specified in 7 of the filings, allowing a total of 0.73 cfs to be diverted for use on 79 acres of land. Domestic supplies and stock water account for 0.155 cfs. A non-consumptive diversion of 0.05 cfs is specified in one right to operate a hydraulic ram.

Because Judd Creek has some fishery value, the Departments of Fisheries and Game have requested that future appropriations be restricted to domestic and stock water use, and non-consumptive uses. No ground-water rights have been established in this area.

SUMMARY

CONCLUSIONS

In accordance with established standards, the Kitsap Peninsula and nearby islands can be classified as being a moderately to heavily watered area with a "sub-humid" to "humid" climate. The report area in general, however, is relatively dry when compared to the "humid" and "very wet" climate experienced in most of western Washington. Lying in the lee of the Olympic Mountains, much of the study area is shielded from the full effect of prevailing storms. The most northerly part receives the least precipitation, averaging about 26 inches annually, while farther south, at higher elevations and where the rain-shadow effect is diminished, annual precipitation averages as much as 80 inches. Although the areal distribution of precipitation varies considerably over the report area, the entire region is usually affected to some degree by passing storms and the climate is quite consistent from year to year.

Temperatures reflect the moderating maritime influence of Puget Sound waters and the Pacific Ocean. The warmest month is usually July or August during which temperatures seldom average much above 70° F. The coldest month is January when temperatures usually average slightly below 40° F.

Storm activity is generally greatest during the months of November, December, January and February and normally reaches a minimum in July. In the northern part of the study area about 75 percent of the annual precipitation occurs during the 7-month period, October through April, and in the southern part, approximately 85 percent is received during this period. The seasonal cyclic variation in precipitation is usually quite smooth except for the month of June when the trend is broken by an anomalous increase. This increase is most noticeable in the areas of least annual precipitation.

Long-term precipitation trends in the report area also display a cyclic variation. Ten-year moving-average graphs indicated annual precipitation was generally lower than normal for several years during the late 1920's and again in the early 1940's while other groups of years during the period 1908-62 tended to be above normal.

Climatological records of the five stations within the report area were inadequate to define the areal distribution of precipitation for the entire area. A basically accurate isohyetal analysis was possible, however, by utilizing these data in conjunction with streamflow records and other climatological data collected at stations located outside but near the periphery of the study area. Before a more refined analysis could be accomplished, it would be necessary to expand and increase the density of the present hydrologic data collection network.

Water budget analyses for the study area by the Thornthwaite procedure (p. 12) show that there is normally insufficient precipitation to meet the potential demands of evaporation and transpiration during most of the summer months. In the southern part of the report area a deficiency usually exists during the months of May through September. To the north, this period of deficiency increases and in the most northerly parts of the study area it usually starts around the end of May and often lasts well into October.

The extent of the summer water deficit is also influenced by the water retention capabilities of the soil. Where soils exhibit a large water holding capacity in the root zone, the deficit is slight, but in places where the soil water retention capability is 2 inches or less, the summer deficit may average as much as 10 to 12 inches of water.

Geologically, the Kitsap Peninsula and adjacent islands are underlain primarily by unconsolidated Pleistocene sediments, with Tertiary volcanic and sedimentary rocks being exposed only along the shoreline areas north and east of Bremerton and in the Green Mountain-Gold Mountain hills west of Bremerton. The Pleistocene materials consist of strata of sand, gravel, clay and till of glacial derivation, and interbeds of peat-bearing silt and clay deposited during interglacial periods. Where saturated below the regional water table, the sand and gravel strata form the aquifers which provide the ground-water supply in the study area.

The aquifers are recharged annually by percolation of seasonal precipitation to the water table. The amount of such recharge is sufficient in most parts of the report area to provide adequate ground-water supplies to meet the present requirements of individual household and community systems. In the heavily populated areas of Port Orchard, Winslow and Gig Harbor, municipal supply wells produce satisfactorily for current demands, and several deep, high capacity wells on the south shore of Sinclair Inlet serve as a supplemental supply for the growing requirements of the City of Bremerton. However, as the amount of natural recharge to aquifers varies with precipitation, aquifers underlying the relatively drier northeasterly parts of the Peninsula may not be sufficiently recharged to allow a sustained perennial yield in the event of large increases in future withdrawals.

In sparsely populated parts of the study area development of ground-water supplies has been insufficient to determine the potential of underlying aquifers. Certain other areas experience a shortage of available ground water owing to unfavorable geologic and topographic conditions. In areas where the dense, impermeable Tertiary volcanic and sedimentary rocks are present ground water supplies are noticeably restricted and wells penetrating these formations will barely furnish enough water for individual domestic needs. On the smaller islands and minor peninsulas, the storage capacity of underlying aquifers is normally small and over-drafting of ground water in such areas could result in saline contamination.

With respect to surface water, the network of 18 continuous-record stream gaging stations on the Kitsap Peninsula represents a relatively high average sampling density of 1 station for every 37 square miles. However, most of these stations were concentrated on streams draining the Green Mountain-Gold Mountain area and runoff has actually been measured from only 23 percent of the total land area included in this study. As a result of the unequal station distribution, streamflow and runoff conditions in the densely gaged area are quite accurately delineated, but less confidence should be placed in the results of analyses for other parts of the report area, especially where continuous-record streamflow data are completely lacking.

In general the study indicated that the mean annual water yield of all lands included in the report, during the period 1946-60, was about 1,042,000 acre-feet, or an equivalent water depth of 29.25 inches over the report area. The variability of annual runoff was found to be slightly greater than that of annual precipitation; however, the annual production of both precipitation and runoff in this area is very consistent and reliable.

Since elevations and temperatures in the Kitsap Peninsula area are not conducive to the accumulation of large snow packs, this factor has little influence on the streamflow regimen and most streams closely follow the seasonal variation of precipitation. The highest peak flows usually occur in the months of November, December, January or February, and the lowest flows normally occur in August or September, or in certain exceptional cases as early as July or as late as October.

Although runoff and streamflow are primarily controlled by the areal and time distribution of precipitation, runoff processes in this area are also influenced to a large extent by the permeability and structure of underlying rock materials. The larger streams are generally effluent (ground water contributes to streamflow); however, widely varying permeabilities of the glacial and alluvial materials, together with seasonal water-table fluctuations, cause some streams to become influent and occasionally intermittent along certain reaches of their channels. Although topography determines the direction of surface runoff, the direction of ground-water movement in the report area is commonly independent of surface features and is mainly controlled by the physical and hydraulic characteristics of the aquifers. Such control by aquifers can permit appreciable quantities of ground water to migrate from one basin to another, especially where the aquifers are large and continuous beneath surface-drainage divides. Evidence of such inter-basin ground-water transfer was found between the Tahuya River and Dewatto Creek basins, Thomas Creek and adjacent drainages, Dogfish Creek and adjacent basins, Burley Creek and Minter Creek basins, and many smaller streams that drain peripheral areas of the peninsula and islands. Intensive field investigation and more data would be required, however, before a more quantitative analysis could be made of these processes.

Instead of the usual drainage pattern where tributaries converge to form a single major river, on the Kitsap Peninsula and adjacent islands most streams tend to radiate out from the upland areas in many diverging systems and few large rivers have evolved. As a result, before appreciable quantities of surface water can be developed and utilized, it would be necessary to construct storage reservoirs or other collection facilities.

The chemical quality of both surface and ground waters in most parts of the Kitsap Peninsula area can be classified as good and suitable for municipal and most industrial uses. The quality of surface water is similar to that of ground water, although surface waters exhibit a seasonal variation in the concentration of chemical constituents, owing to the effects of dilution during periods of high flow. Also, in those areas of greater precipitation, such as the higher parts of the western upland, the greater degree of dilution keeps concentrations low, while in the easterly and northerly parts of the study area mineral concentrations are highest. In some watersheds, such as the Union River basin, iron concentration, organic coloration, and stagnant odor creates a slight problem during late summer and fall months.

Ground water in deeper, geologically older, aquifers has generally a higher mineral concentration which would require treatment for certain industrial applications. Iron and silica concentration is usually higher in deeper aquifers, below the Colvos Sand. Geographically, iron concentrations are consistently greater than 0.10 part per million in the northern and central uplands and on Bainbridge Island, and in the southerly parts of the Longbranch peninsula, Gig Harbor peninsula and Vashon and Maury Islands. Nitrate concentration is usually highest in shallow wells due to local contamination by decayed organic materials and fertilizers. The maximum concentration of nitrate, however, is still considerably below the standard limit set for drinking water by the U. S. Public Health Service. Along some shoreline areas, particularly in the Hansville area of the northern upland and in the Winslow area of Bainbridge Island, slight saline contamination was detected.

One result of the chemical studies of ground water was the indication that different geologic formations yielded water of different quality. The tests suggest that, where other information is lacking to determine underlying geologic formations, chemical analyses of water from various depths might lead to an interpretation of the underlying stratigraphy.

In considering water use, the basic and most difficult problem encountered in the Kitsap Peninsula area is the completely out-of-phase occurrence of the supply with respect to the demand. Natural consumptive uses, expressed in terms of evapotranspiration, are greatest in summer when the supply, provided by precipitation, is least. Also, the needs of man reach a maximum in summer when the area's population is increased by resort trade and when irrigation demands are greatest. Additional storage facilities, which would capture some of the surplus winter runoff waters for use during the summer deficit period, could help to offset some of the imbalance. However, if the area as a whole experiences a large increase in population and/or industrial growth, requiring additional large supplies of good quality water, it might be necessary to go to areas outside the Kitsap Peninsula and import water from stream systems which have major uncommitted supplies. The most probable sources for this purpose are the larger streams draining the eastern slopes of the Olympic Mountains.

In general, the water-use inventory has shown that people in the report area are quite conscious of protecting their water needs. The total number of active water-right filings, 1101,(966 for surface water and 135 for ground water) was approximately 5 percent of all the active filings on record with the Division of Water Resources at the end of the year 1962. The maximum annual consumptive water demand of 112,500 acre-feet under these filings represents only about 11 percent of the estimated average annual yield of the area. If feasible, potential surface storage developments in the area could augment the total supply to about 30 percent of the mean annual yield. No estimates were made of the safe sustaining ground-water yield but existing developments in most areas have barely tapped this part of the resource.

RECOMMENDATIONS

It has been concluded from the inventory that water supplies in most parts of the report area are adequate to meet present needs. However, with the anticipated growth of the area, it may soon become necessary to enlarge existing systems and develope new sources of supply. To help insure optimum benefits from the resource, it is strongly recommended that water-resource study committees be created at both county and local levels. Such committees could represent the interests of local people and could meet with appropriate private, municipal, county, state, federal and other public agencies in planning and coordinating a logical and orderly program of water-resource development.

It is acknowledged that the foregoing inventory is only a start toward complete understanding of hydrologic processes in the Kitsap Peninsula area. The study disclosed many deficiencies in basic data and indicated various areas where more information is needed. Therefore, to enhance future water-resource investigations and to assist those who will be entrusted with the responsibility of managing and developing the area's water resources, the authors offer the following specific recommendations:

A. Studies of precipitation and climate in the report area indicated that existing climatological data were only adequate to present a general picture of conditions. Consequently, prior to any future comprehensive hydrologic studies of this area, it is recommended that the establishment of additional climatic stations be considered for the following general locations:

1. Hansville or Port Gamble
2. Bangor
3. Suquamish or Indianola
4. Poulsbo or Keyport
5. Seabeck
6. Silverdale
7. Winslow
8. Holly (1 or 2 miles southeast)
9. Camp Union or Hintzville
10. Gold Mountain lookout
11. Dewatto (1 mile south)
12. Belfair
13. Mission Lake
14. Square Lake
15. Burley or Purdy
16. Vashon
17. Tahuya (1 or 2 miles northwest)
18. Artondale (1 mile southwest)
19. Longbranch (1 mile west)

If for economy or other reasons it is necessary to limit the period of data collection at any of the selected locations, the period of operation should be chosen so as many stations as possible will have simultaneous periods of record. Also the period of operation should be coincident with that of any stream gaging program selected, if possible.

B. In conjunction with the above program for obtaining additional climatological data, it is recommended that simultaneous collection of continuous record streamflow data be considered for the indicated general locations on the following streams:

*1. Tahuya River above tidewater
2. Rendsland Creek above tidewater
3. Anderson Creek near Holly above tidewater
4. Stavis Creek above tidewater
5. Seabeck Creek above tidewater
*6. Big Beef Creek above tidewater
7. Anderson Creek near Bangor above tidewater
8. Unnamed stream No. 149 near Lofall above tidewater
9. Gamble Creek above tidewater
10. Unnamed stream No. 166 near Hansville above tidewater
11. Silver Creek at Eglon above tidewater
12. Grovers Creek above tidewater
13. Steel Creek above tidewater
14. Barker Creek above tidewater
*15. Clear Creek above tidewater
16. Lost Creek above confluence with Chico Creek
17. Gorst Creek above City of Bremerton diversion
18. Curley Creek above tidewater
19. Olalla Creek above tidewater
20. Crescent Creek above tidewater
21. Artondale Creek above tidewater
22. Purdy Creek above tidewater
23. Unnamed stream No. 385 at Longbranch above tidewater
24. Rocky Creek above tidewater
*25. Coulter Creek above tidewater
26. Unnamed stream No. 463 on Bainbridge Island above tidewater
27. Judd Creek on Vashon Island above tidewater
28. Fisher Creek on Vashon Island above tidewater
29. Needle Creek on Vashon Island above tidewater
30. Unnamed stream No. 569 on Anderson Island above tidewater

Should such a program be initiated, in whole or in part, it is suggested that, as a minimum, no less than 3 and preferably 5 water-years of record be obtained concurrently at each station. The actual length of period should be based upon the requirements of the program and other needs of the specific location. In addition, it is recommended that the locations marked with an asterisk (*) be considered for long-term data collection sites. During such a program it would be desirable to obtain additional data at the sites of some of the discontinued gaging stations in the area. To permit more thorough analyses, miscellaneous flow measurements should also be made during the same period at locations indicated in Table 11 where no continuous records have been collected.

C. In analyzing streamflow data collected in the report area, a more thorough investigation should be made of the effects of geologic conditions on ground-water movement and base flow.

D. Since actual water use in the area, as opposed to potential use expressed by water-right filings, is presently unknown, any further analyses of the resource should at least provide for an examination and measurement of major water diversions, consumptive use and return flow during the period of study.

E. To more completely evaluate the ground-water resources of the Kitsap Peninsula area it will be necessary to conduct a more detailed geologic study than that encompassed in the present report. Particularly in those areas undergoing rapid residential development and where future municipal and industrial growth is anticipated, it is recommended that a more thorough study be made of underlying water-bearing formations. In order to determine, both quantitatively and qualitatively, the character of the major aquifers and extent and direction of ground-water movement it will be necessary to initiate a program that will include compilation of data on existing wells in the area and additional research on underlying geology by test drilling, and geophysical methods. Such a program should incorporate the following:

1. A canvass of existing sources of ground-water withdrawal in the area under study. This should include a tabulation of representative wells and major spring zones supplied by aquifers at various depths and locations. The canvass should record such pertinent information as:

a. Location and elevation of well or spring
b. Flow of spring, with date of measurement
c. Observed geologic character of spring zone
d. Depth and diameter of well and well casing
e. Driller's log of materials penetrated
f. Depth and thickness of water-bearing zones
g. Static water level, measured periodically, if possible
h. Pump test of well (yield in g.p.m., rate of of drawdown and recovery of water level)
i. Type and size of pump
j. Chemical analyses and temperature of water samples
k. Present use of well
l. Previous history of well use, changes in yield

2. Establishment of a network of observation wells to provide continuous-record information on ground-water conditions in all parts of the report area. If possible, these wells should be representative of different depth aquifers at each selected location. Shoreline wells should be included to provide data on the extent of local or widespread saline contamination. For each well selected, water-level measurements should be obtained at least on a monthly basis, and chemical analyses at least on a quarterly-year basis, for a period of not less than 5 years.

3. In areas where present ground-water development has been insufficient to provide complete and reliable information, a test drilling program should be conducted to determine the character of underlying geology and the extent of water-bearing formations. Such a program could be supplemented by geophysical investigations to aid in interpreting subsurface features.

F. To provide for future increases in the water demand, the feasibility of potential storage sites suggested in this report should be more thoroughly investigated. Those sites that appear to be most desirable should be completely examined from a geologic, engineering and economic standpoint. Then, to keep development costs to a minimum, it would be prudent to obtain control, as soon as possible, of all lands involved in projects that will be initiated in the foreseeable future.

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APPENDIX

APPENDIX A

Drillers' Logs

Appendix A lists drillers' logs of all wells used as the basis for construction of the diagrammatic geologic sections shown on Plate 1. Drillers' logs have been modified in some cases to incorporate into larger units two or more strata of lithologically similar materials. The wells are tabulated in order of their positions within west-to-east sections A-A' through L-L' and within south-to north section M-M'-M''.

Where a well appears in both west-to-east and south-to-north sections, it is tabulated with the former.

Information tabulated includes well number (see Fig. 9), name of owner or tenant, approximate altitude in feet above mean sea level, name of driller if known, depth in feet and diameter in inches, SWL (static water level in feet), Dd (drawdown of water level in feet), yield in gallons per minute (gpm), depth of water-bearing materials, description and thickness of materials penetrated by driller, results of chemical analyses in parts per million (ppm), and miscellaneous pertinent data.

APPENDIX A

DRILLERS' LOGS

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION A-A'		
28/2E-7M:	F. E. Stubbs. Altitude 15 feet. Drilled by M. F. Ragsdale. Cased 169' x 6". Chloride: 98 ppm; Hardness ($CaCO_3$): 224 ppm.		
	sand and peat	25	25
	sand, clay, water-bearing, with some gas	144	169
	clay, hard		at 169
28/2E-18J:	Mrs. Pace. Formerly Puget Mill Co. test well. Altitude 60 feet. 206' x (?)". Yielded some gas.		
	clay, buff, sandy	15	15
	sand, gray-buff, clayey	40	55
	clay, gray, sandy, water reported at 67 feet	21	76
	sand, gray, fine to coarse, gravel at base	51	127
	clay, gray, silty to sandy	31	158
	gravel and gray clay	16	174
	clay, gray, silty, some gravel at 180 feet, yields some gas at 190-203 feet	32	206
28/2E-17M:	Evergreen Gas and Oil Co. Altitude 65 feet. Drilled in 1940 as oil and gas test well.		
	sand and clay, many alternating strata, water-bearing sand 12-33 feet	35	35
	sand, water-bearing	133	168
	sand and clay, alternating strata	30	198
	sand and "clay shale"	38	236
	sand and clay, alternating strata, water-bearing sand 238-273 feet and 288-302 feet	86	312
	clay, black to blue	172	484
	sand and clay, alternating strata, water-bearing at 484-496 feet, 522-54- feet, 551-563 feet	241	725
	clay, gravel, and wood	15	740
	sand and gravel, water-bearing	32	772
	clay and sand, alternating strata, water-bearing at 772-785 feet, 839-860 feet	133	905
	sand, water-bearing, trace of oil and gas	29	934
	"hardpan," gravel and clay	19	953
	clay, sandy, some gas	23	976
	sand, clay, "hardpan" at 992-995 feet, water-bearing at 978-991 feet	129	1,105
	shale, blue-gray, sandstone layers at top	101	1,206

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION A-A'--continued		
28/2E-16J:	R. Randall. Altitude 10 feet. Drilled by T. G. Philpott, 1955. 132' x 6". SWL 3 ft., Dd 9 ft. at 40 gpm, Dec. 1955.		
	sand and gravel, with thin clay beds	132	132
28/2E-22B:	U.S. Coast Guard. Altitude 80 feet. Drilled by M. F. Ragsdale, 1948. Casing 109' x 6". Yields about 50 gpm. Chemical analysis available.		
	"hardpan," boulders	12	12
	gravel, cemented	15	27
	clay, blue	2	29
	gravel, cemented	5	34
	clay, blue	44	78
	sand, gray, water-bearing	31	109
	SECTION B-B'		
27/1E-28A:	Ballard Kiwanis. Altitude 65 feet. Drilled by T. G. Philpott, 1954. 69' x 6". SWL 61 ft., yields 7 gpm.		
	soil, sand and gravel	10	10
	clay, yellow and blue	29	39
	"hardpan"	9	48
	clay, yellow and blue	17	65
	sand and gravel, water-bearing	4	69
27/1E-27K:	O. Lanning. Altitude 280 feet. Drilled by T. C. Philpott 1953. 76' x 8". SWL 60 ft, 200 gpm yield. Perforated 71-76 ft.		
	sand, gravel	5	5
	sand, clay	22	27
	"hardpan"	7	34
	sand, gravel, with clay	37	71
	sand, gravel, water-bearing	5	76
27/2E-28A:	E. Foster. Altitude 160 feet. Drilled by T. G. Philpott 1956. 82' x 6". SWL 62 ft. DD 10 ft at 8 gpm.		
	sand, clay	18	18
	gravel, clay	4	22
	"hardpan"	12	34
	sand, clay	8	42
	"hardpan"	28	70
	sand, clay, and gravel	10	80
	sand, gravel, water-bearing	2	82

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION B-B'--continued		
27/2E-22Q:	P. W. Waldron. Altitude 100 ft. Drilled by C. Ruby, 1944. Cased 140' x 6". SWL 27 ft., 1944.		
	till	30	30
	sand, water-bearing	108	138
	gravel, water-bearing	2	140
27/2E-25D:	U.S. Army, Corps of Engineers. Altitude 400 ft. Drilled by Service Hardware, 1954. 295' x 6". SWL 230 ft. Dd 23½ ft at 20 gpm. Perforated 267-282 ft.		
	soil	3	3
	gravel, cemented, with clay	50	53
	clay, sand	91	144
	sand, clay	92	236
	sand, fine	59	295
	SECTION C-C'		
26/1E-5J:	F. H. Harlow. Altitude 170 feet. Drilled by T. G. Philpott, 1956. 176' x 6". SWL 142 ft. Dd 28 ft at 5 gpm.		
	sand, clay and gravel	9	9
	sand, clay, water-bearing	91	100
	sand	16	116
	clay, blue	9	125
	silt	10	135
	sand, fine, with seeps	15	150
	silt	5	155
	sand, blue clay, water-bearing	25	180
26/1E-9L:	S. Birkland. Altitude 390 ft. Drilled by Stoican Drilling Co. 1959. 485' x 6"-4". SWL 175 ft. Dd 195 ft. at 11 gpm.		
	soil	3	3
	"hardpan"	16	19
	clay, sandy	68	87
	sand, cemented	43	130
	clay, blue, silty, with seeps 212-228 feet	208	338
	sand and gravel, water-bearing	2	340
	clay, blue	10	350
	sand, blue, and clay	22	372
	clay, blue and sand	10	382
	sand and gravel, cemented	10	392
	sand and gravel	10	402
	sand, cemented	3	405
26/1E-10M:	U.S. Army, N.I.K.E. base. Altitude 280. Drilled by T. G. Philpott, 1955. 128' x 6". SWL 96 ft, Dd 16 ft at 18 gpm. Screened 118-128'.		
	"hardpan," with soft hardpan 36-41 ft	100	100
	sand, gravel, and clay	3	103
	sand, coarse, gravel, water-bearing	25	128
26/1E-15K:	N. Tornensis. Altitude 40 ft. Drilled by Nicholson Drilling Co., 1954. 203' x 8" flowing well. Perforated 191 to 201 ft.		
	till	30	30
	sand	1	31
	clay, blue, sandy	158	189
	sand and gravel, water-bearing	14	203

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION C-C'--continued		
26/1E-13C:	D. R. Stevenson. Altitude 365. Drilled by Sjolseth, 1954. 248' x 6". SWL 119 ft. Dd 4½ ft at 22 gpm. Perforated 246 to 247 ft.		
	"hardpan," soil, and gravel	25	25
	sand, red, and mud, with seeps 50 to 95	70	95
	sand, silty, some gravel	30	125
	sand, red, water-bearing	50	175
	sand, medium and coarse, with gravel, fine	20	195
	sand, clean and gravel, fine	15	210
	sand, medium and coarse, with gravel	36	246
	gravel, medium to coarse	2	248
26/2E-18D:	H. E. McMahill. Altitude 365 ft. Drilled by Sjolseth, 1959. 284' x 6". Casing 268' x 6". SWL 115 ft. Dd 35 ft at 125 gpm. Screened 270 to 284 ft. Water temperature 52°.		
	clay and "hardpan"	100	100
	gravel, hard	40	140
	clay and sand	30	170
	sand, medium-grained	30	200
	sand, dirty, with mud	22	222
	sand, fine	30	252
	sand, clean, medium-grained	8	260
	sand, fine to coarse grained, and gravel, medium to coarse	10	270
26/2E-9L:	---Eisenhardt. Altitude 10 ft. Drilled by T. G. Philpott, 1955. 46' x 6" flowing well.		
	sand	20	20
	gravel and sand, water-bearing	6	26
	clay, blue	20	46
26/2E-10R:	Indianola Water Service. Altitude 115 ft. Drilled by J. L. Bell, 1955. 270' x ?".		
	sand, gravel, clay and silt, alternating strata; water-bearing 35-53 ft, peat and wood bearing 67-100 and 135-146 ft	146	146
	clay, blue, and gravel	29	175
	clay, blue	35	210
	clay, blue, and silt, with gravel	28	238
	sand, blue, fine, and clay, water-bearing	7	245
	sand, hard, with clay and gravel	25	270
26/3E-7M:	U.S. Navy. Altitude 110 ft. Drilled by J. J. Bell, 1942. Cased 136' x 10-6". Chemical analysis available.		
	soil	3	3
	till	38	41
	clay, blue, hard, and sand with fine gravel	34	75
	sand and gravel	53	128
	gravel, cemented, water-bearing	8	136

SECTION D-D'

26/1W-36K: R. Bondy. Altitude 110 ft. Drilled by T. G. Philpott, 1961. 140' x 6". SWL 106 ft.

Material	Thickness (feet)	Depth (feet)
sand and gravel	4	4
"hardpan"	16	20
sand, clay, and gravel	70	90
"hardpan," seeps at 90 ft	26	116
clay, yellow, and sand	6	122
sand, gravel, with clay, water-bearing	18	140

26/1E-32M: U.S. Navy. Altitude 300 ft. Drilled by N. C. Jannsen. 700' x 10". Cased to 570 ft. Yields 550 gpm.

Material	Thickness (feet)	Depth (feet)
sand, loose	30	30
sand, hard	30	60
gravel, coarse	20	80
sand and gravel	30	110
sand	35	145
clay	60	205
sand, black, coarse, water-bearing	5	210
gravel, fine, water-bearing	15	225
clay, hard	10	235
rock	25	260
sand and clay	20	280
sand and gravel, water-bearing	40	320
clay, blue	30	350
sand, coarse, gravel and boulders, water-bearing	220	570
clay, blue	130	700

26/1E-32L: U.S. Navy. Altitude 295 ft. Drilled by N. C. Jannsen, 1945. 165' x 8". SWL 129 ft, February, 1949. Dd 2 ft at 30 gpm.

Material	Thickness (feet)	Depth (feet)
sand	4	4
"hardpan"	36	40
rock and gravel	10	50
gravel, cemented	20	70
sand and gravel, loose	55	125
sand and gravel	33	158
sand, water-bearing	7	165

26/1E-32K: U.S. Navy. Altitude 295'. Drilled by N. C. Jannsen, 1944. 690' x 18"-10"-8". Casing set to 685 ft. SWL 228 ft, Sept., 1944. Dd 82 ft at 350 gpm.

Material	Thickness (feet)	Depth (feet)
soil	4	4
"hardpan"	5	9
sand and gravel	41	50
gravel and boulders	3	53
sand, with fine gravel	90	143
clay, blue	67	210
gravel, black, hard	65	275
clay, sandy	35	310
gravel, sandy, hard	55	365
sand, water-bearing	5	370
gravel, hard	15	385
clay, blue, sandy	70	455
sand, hard, and gravel	83	538
sand, clay, and gravel, several strata each	152	690

SECTION D-D'--continued

26/1E-34C: ---Schmeil. Altitude 165 ft. Drilled by C. Ruby, 1950. Cased 196' x 6". SWL 121 ft., Oct. 1950.

Material	Thickness (feet)	Depth (feet)
soil	3	3
till	52	55
clay, blue	134	189
clay, sandy	1	190
gravel, water-bearing	6	196

26/1E-36N: U.S. Navy. Altitude 19 ft. Drilled by N. C. Jannsen, 1940. 1036' x 22"-12". Flowing well. Perforated 179-222 ft., 339-429 ft., 584-630 ft., 674-805 ft., 987-1036 ft.

Material	Thickness (feet)	Depth (feet)
soil	12	12
till	9	21
gravel, fine and sand	4	25
clay, blue and brown, and gravel	20	45
clay, blue and gravel, with peat logs at 70 and 90 ft	47	92
clay	47	139
sand, clay, and gravel, undifferentiated	897	1036

26/2E-33M: J. D. Brownell. Altitude 60 ft. Drilled by B. Strom, 1947. Cased 120' x 6".

Material	Thickness (feet)	Depth (feet)
till	20	20
clay, blue	90	110
gravel, water-bearing	10	120

26/2E-34M: W. R. Grubb. Altitude 50 ft. Drilled by H. O. Meyer, 1945. Cased 68' x 6". SWL 48', Sept. 1945.

Material	Thickness (feet)	Depth (feet)
"hardpan"	30	30
clay, "hardpan" and sand	7	37
clay, some sand	13	50
clay, sand, and gravel, water-bearing	18	68

26/2E-35G: Fay Bainbridge State Park. Altitude 70 ft. Dug by Rathburn. 35' x 24". SWL 12 ft. No drawdown at 5 gpm.

Material	Thickness (feet)	Depth (feet)
clay and gravel	35	35

SECTION E-E'

25/1W-20D: R. M. Priddy. Altitude 95 ft. Drilled by Nicholson, 1959. Cased 180' x 6". SWL 90 ft. Dd 10 ft at 30 gpm. Perforated 95-120 ft, 125-150 ft.

Material	Thickness (feet)	Depth (feet)
"hardpan"	90	90
clay, yellow	1	91
"hardpan," yellow	4	95
"hardpan," rocky, water-bearing	25	120
"hardpan," with sand, water-bearing 125-152 ft	32	152
"hardpan," yellow	38	190

Well Number	Material	Thickness (feet)	Depth (feet)

SECTION E-E'--continued

25/1W-20J: R. E. Hadley. Altitude 20 ft. Drilled by T. G. Philpott, 1948. Cased 68' x 6". Flowed July, 1950, with 20 ft head.

Material	Thickness (feet)	Depth (feet)
soil	4	4
"hardpan"	11	15
gravel, water-bearing	2	17
gravel, cemented	28	45
gravel, water-bearing	6	51
gravel, cemented	12	63
sand and gravel, water-bearing	5	68

25/1E-17K: Central Kitsap School Dist. #401. Altitude 180 ft. Drilled by Nicholson, 1956. 175' x 8". Cased to 170 ft. Screened 170-175 ft. SWL 80 ft. Dd 55 ft at 25 gpm.

Material	Thickness (feet)	Depth (feet)
"hardpan," some sand	72	72
sand, brown	10	82
"hardpan," water-bearing sand	13	95
clay, blue	72	167
pea gravel, sand, water-bearing	8	175

25/1E-21B: ---McKaeg. Altitude 100 ft. Drilled by T. G. Philpott, 1948. Cased 91' x 6". SWL 31 ft, June, 1948.

Material	Thickness (feet)	Depth (feet)
soil	2	2
"hardpan"	8	10
gravel, loose, water-bearing	5	15
clay, sandy	23	38
gravel, water-bearing	8	46
sand, fine, with gravel	9	55
sand, coarse	25	80
sand	5	85
gravel, fine, water-bearing	3	88
sand, water-bearing	3	91

25/1E-23K: B. Bitle. Altitude 190 ft. Drilled by T. G. Philpott, 1949. Casing 48' x 6", perforated at 40 ft. SWL 32 ft, June, 1949.

Material	Thickness (feet)	Depth (feet)
dug well	30	30
sand, fine	8	38
clay, blue, with sand	10	48

25/1E-24H: F. Strand. Altitude 15 ft. Drilled by Wade, 1959. 274' x 8" flowing well. Dd 20 ft at 250 gpm. Temperature 48°F.

Material	Thickness (feet)	Depth (feet)
sand, dirty	250	250
clay, blue	24	274

25/2E-20K: Bainbridge Island School District. Altitude 70 ft. Drilled by H. O. Meyer. 62' x ?". SWL 52 ft.

Material	Thickness (feet)	Depth (feet)
dirt and gravel	15	15
clay	7	22
"hardpan"	23	45
clay, gray	10	55
gravel, water-bearing	4	59
clay and brown sand	3	62

SECTION E-E'--continued

25/2E-21F: A. Haff. Altitude 165 ft. Drilled by H. O. Meyer. Casing 86' x 6", perforated. SWL 61 ft, July, 1945.

Material	Thickness (feet)	Depth (feet)
soil and gravel	10	10
clay, gray	15	25
"hardpan" and gravel	27	52
clay, gravel, and water	22	70
gravel	5	75
gravel, water-bearing	11	86

25/2E-27L: J. R. Book. Altitude 10 ft. Drilled by N. C. Jannsen, 1931. Cased 103' x 8", perforated 43-47 ft, and 93-103 ft. Flowing well, May, 1950.

Material	Thickness (feet)	Depth (feet)
till (clay and rocks)	9	9
gravel	9	18
sand	2	20
gravel, cemented	3	23
gravel	12	35
gravel and sand	46	81
gravel	22	103

25/2E-27K: Town of Winslow. Altitude 40 ft. Drilled by Parker and Hill. 801' x 12"-8"-6". Casing perforated 743-782 ft.

Material	Thickness (feet)	Depth (feet)
gravel, cemented, and sand	109	109
clay, blue	52	161
sand, fine	9	170
gravel and sand, water-bearing	15	185
clay	65	250
clay and gravel	20	270
clay, sandy	50	320
silt, with clay streaks	110	430
clay	280	710
sand, coarse	12	722
sand, fine	35	757
sand and gravel, water-bearing	39	796
clay	5	801

25/2E-26G: D. C. Buchanan. Altitude 130 ft. Drilled by N. C. Jannsen, 1930. Cased 175' x 6". SWL 80'(?).

Material	Thickness (feet)	Depth (feet)
old well	67	67
sand, brown	30	97
clay, blue, and silt	58	155
sand, black, fine	16	171
sand, water-bearing	4	175

25/2E-25C: Y.W.C.A. Altitude 100 ft. Drilled by N. C. Jannsen, 1928. Cased 109' x 8".

Material	Thickness (feet)	Depth (feet)
gravel	15	15
"hardpan"	5	20
clay, hard	15	35
clay, blue, water-bearing at 52 ft	23	58
clay and gravel	2	60
gravel, cemented	10	70
clay, sandy	15	85
sand, fine, water-bearing at 93 ft	24	109

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION F-F'		
25/2W-35D:	Minnig Tree Farm. Altitude 280(?) ft. Drilled by T. G. Philpott. 324' x 6". SWL 305 ft, Sept., 1957. Dd 20 ft. at 3 gpm.		
	sand, gravel and clay	3	3
	"hardpan," and sand, gravel	107	110
	sand and clay	20	130
	gravel, sand and clay	35	165
	sand and clay	35	200
	sand, gravel and clay	35	235
	"hardpan"	5	240
	sand, gravel, and clay, water-bearing 312-324 ft	84	324
24/1W-6H:	M. Grover. Altitude 460 ft. Drilled by T. G. Philpott, 1949. Cased 123' x 6".		
	soil	4	4
	"hardpan"	36	40
	gravel and sand, hard	18	58
	gravel and sand, with yellow clay	27	85
	clay, yellow, sandy	36	121
	gravel, water-bearing	3	123
24/1W-2C:	C. H. Freegrove. Altitude 430 ft. Drilled by T. G. Philpott. Cased 98' x 6". SWL 5-20 ft.		
	soil and "hardpan"	14	14
	sand and gravel	29	43
	sand and clay	15	58
	"hardpan"	11	69
	sand and gravel, water-bearing	26	95
	sand, yellow	3	98
24/1W-1A:	U.S. Marine Corps. Altitude 400 ft. Drilled in 1939. 371' x 12"-10"-8", with casing to 363 ft, screen 363-371 ft. SWL 258 ft, 1939.		
	gravel, coarse, sand, and small rocks	38	38
	gravel, fine, and sand	38	76
	sand, some gravel	5	81
	clay, blue	1	82
	sand and gravel, with some clay	219	301
	clay, blue	61	362
	sand, fine, with gravel, water-bearing	9	371
24/1E-5E:	Erland's Point Water Co., Inc. Altitude 75 ft. Drilled by Nicholson, 1955. Cased 251' x 12". Perforated 140-224 ft, 238-243 ft. Flowing well, March, 1955. Dd 42 ft at 500 gpm.		
	sand and gravel	20	20
	"hardpan"	5	25
	clay and peat	5	30
	sand, gravel and clay, water-bearing	17	47
	clay, blue, sandy	2	49
	"hardpan"	34	83
	sand, fine, silty	4	87
	clay, blue	1	88
	"hardpan"	7	95
	sand, gravel and wood, with seeps	5	100
	clay, blue, with peat and wood	17	117
	sand, brown, fine, with clay, water-bearing	13	130
	clay, light gray to yellow, with seams of sand, gravel and water	50	180

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION F-F'--continued		
24/1E-5E:	Continued		
	sand and gravel, with clay, water-bearing	44	224
	clay, blue	6	230
	clay, yellow, water-bearing	12	242
	gravel, water-bearing	1	243
	clay, yellow, and gravel	11	254
24/1E-5Q:	M. Peters. Altitude 40 ft. Drilled by T. G. Philpott, 1949. Cased 160' x 6". Supply reported "inadequate" and well not used.		
	soil	6	6
	"hardpan"	2	8
	sand and gravel, water-bearing	42	50
	clay, blue	110	160
24/1E-3R:	H. Burton. Altitude 220 ft. Drilled by T. G. Philpott, 1950. Cased 100' x 6". SWL 10 ft, July, 1950.		
	dug well	15	15
	clay and sand	68	83
	clay, hard, with sand	12	95
	sand, water-bearing, possibly into Tertiary bedrock	5	100
24/1E-1J:	North Perry Ave. Water Dist. Altitude 365 ft. Drilling supervised by Robinson and Roberts, 1959. 419' x 12". SWL 110 ft, July 1959. Dd 81 ft at 750 gpm. Temperature 49½°F.		
	"hardpan," sandy	63	63
	clay, blue	122	185
	"hardpan," sandy	10	195
	"hardpan"	23	218
	gravel, coarse	9	227
	gravel, cemented	10	237
	sand and gravel, tight	15	252
	sand and gravel, blue-gray, loose	21	273
	"hardpan"	2	275
	sand and gravel, brown, loose	23	298
	clay, blue	6	304
	sand and gravel, loose	3	307
	sand, blue, fine	34	341
	gravel and sand	7	348
	gravel, cemented	7	355
	sand and gravel, blue-gray, tight	18	373
	gravel and sand, loose	19	392
	gravel and sand, with clay layers	7	399
	clay, hard	20	419
24/2E-7D:	North Perry Water Dist. Altitude 320 ft. Drilled under supervision of Robinson and Roberts, 1955. 480 x 8". SWL 98 ft. Dd 112 ft at 412 gpm.		
	clay, brown, sandy	15	15
	clay, blue, and sand	71	86
	gravel, brown, cemented	9	95
	"hardpan," blue	13	108
	"hardpan," gray	69	177
	sand, hard, and gravel	9	186
	clay, blue, with gravel and sand	8	194
	clay, blue, with sand	16	210
	clay, gray	106	316
	sand, dark, water-bearing	15	331
	sand, dark, cemented	28	359
	gravel, fine, and sand, water-bearing	20	379

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION F-F'--continued		
24/2E-7D:	Continued		
	gravel and sand	26	405
	sand	13	418
	sand and gravel	18	436
	gravel, cemented	21	457
	sand	23	480
24/2E-9H:	M. L. Swanberg. Altitude 15 ft. Drilled 1948. 135' x 6"-5". Cased to 125 ft. Yield reported 15 gallons per hour.		
	"hardpan," with seepage 28-30 ft	30	30
	gravel, fine with sand and water ..	2	32
	"hardpan," gray, water-bearing at 128 ft	96	128
	shale, brown	1	129
	shale, blue	6	135
24/2E-10B:	U.S. Navy. Altitude 166 ft. Drilled by N. C. Jannsen, 1948. 98' x 12"-8". SWL 35 ft, 1948. Reportedly pumps sand. Chemical analysis available.		
	clay, yellow, and rock	20	20
	sand, hard, and "hardpan"	15	35
	clay, blue	10	45
	sand and gravel, water-bearing ...	40	85
	clay...........................	13	98
	SECTION G-G'		
24/2W-19A:	---Fisk. Altitude 145 ft. Drilled by T. G. Philpott, 1950. 184' x 6". SWL 140 ft, August, 1950.		
	clay, yellow, and 2 ft of soil	10	10
	clay, blue, with sand	50	60
	sand, clay and gravel	6	66
	sand and gravel, with seepage, with "hardpan" at 68-74 ft and 76-78 ft	17	83
	sand, fine, dry, water-bearing at 150-169 ft	86	169
	clay, blue	2	171
	sand, fine, water-bearing, with clay layers 178-184 ft.......	13	184
24/2W-17R:	A. Olson. Altitude 60 ft. Drilled by T. G. Philpott, 1946. Cased 394' x 6". "Flowed at one time."		
	soil and clay...................	5	5
	gravel.........................	6	11
	sand and gravel	17	28
	clay, blue, with seepage 56-75'.	112	140
	clay and sand, water-bearing.....	45	185
	clay, blue	60	245
	"hardpan"......................	11	256
	sand, fine	26	282
	sand,hard, blue, water-bearing...	112	394
24/1W-29Q:	H. Stockton. Altitude 525. Drilled by T. G. Philpott, 1949. Cased 85' x 6". Perforated 15-25 ft.		
	soil	2	2
	gravel, water-bearing	26	28
	clay, yellow, some sand	37	65
	sand, hard	20	85

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION G-G'--continued		
24/1W-35P:	J. P. Belly. Altitude 330 ft. Drilled by T. G. Philpott, 1947. Casing $87\frac{1}{2}$' x 6", gravel-packed. SWL 52 ft, 1947.		
	dug............................	40	40
	gravel	5	45
	sand, fine	5	50
	sand, water-bearing	10	60
	sand and clay	14	74
	sand, fine, water-bearing	5	79
	sand and clay	8	87
24/1E-31A:	U. S. Federal Housing Authority		

ERRATA NOTE: This well initially recorded by F. H. A., under Certificate 84-D, as located in T. 24 N., R. 1 E. Subsequent information discloses well to be same as 24/2E-31A, under current ownership of Annapolis Water District. See record of well as described under Section G'-G" on following page.

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION G'-G"		
24/1E-32J:	E. Frone. Altitude 25 ft. Drilled by T. G. Philpott. Casing 110' x 6". Supplies three families.		
	sand and gravel	20	20
	"quicksand"	75	95
	gravel and sand, water-bearing ...	15	110
24/1E-33L:	City of Bremerton. Altitude 25 ft. Drilled by N. C. Jannsen, 1945. Cased 622' x 16". Flowing well, 1949. Dd 66 ft at 875 gpm. Chemical analysis available.		
	clay, blue	103	103
	gravel, coarse..................	13	116
	clay, sandy, and fine sand	32	148
	sand, clay and gravel	92	240
	clay and gravel	30	270
	sand...........................	34	304
	gravel, cemented	30	334
	clay,sandy	61	405
	sand and gravel	25	430
	sand...........................	70	500
	sand, coarse	42	542
	gravel	18	560
	gravel, coarse,to $1\frac{1}{2}$" diameter ...	62	622
24/1E-26K:	City of Port Orchard. Altitude 100 ft. Drilled by O. E. Erdman, 1946. 792' x 10"-5". Cased to 780 ft, perforated 215-238 ft, and 764-780 ft. Temperature 49°F. Chemical analysis available.		
	clay, blue	96	96
	clay, brown	6	102
	sand and gravel	40	142
	clay, sandy	38	180
	"hardpan"	5	185
	sand and gravel	30	215
	gravel, fine	23	238
	clay, sandy	270	508
	sand, fine, with blue clay 636-648 ft	256	764
	gravel, coarse, water-bearing	16	780
	sand, fine	12	792

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION G'-G"--continued		
24/1E-25E:	Annapolis Water Dist. Altitude 35 ft. Drilled by N. C. Jannsen, 1945. Cased 1,133 ft (12" to 157 ft, 10" to 1,133 ft). Perforated 437-548 ft, 668-984 ft, 1,035-1,111 ft. Flowed 750 gpm in Oct., 1949, with 3 foot pressure head. Dd 55 ft at 1700 gpm in 45 hrs. Water has slight H_2S odor.		
	sand	30	30
	clay, sandy	230	260
	sand, fine to coarse	160	420
	sand and gravel	155	575
	clay, blue	46	621
	clay, blue, and gravel	29	650
	clay, blue, and sand	16	666
	sand and gravel	80	746
	gravel, cemented	179	925
	sand	65	990
	sand, clay and gravel	30	1020
	sand and gravel	47	1073
	sand and clay	19	1092
	gravel, cemented	41	1133
24/2E-30Q:	H. Hatlem. Altitude 380 ft. Drilled by T. G. Philpott, 1948. Cased 92' x 6". SWL 64(?) ft.		
	soil	3	3
	"hardpan"	37	40
	sand	22	62
	sand, yellow, and clay	20	82
	sand and gravel, water-bearing	10	92
24/2E-31A:	Annapolis Water Dist. Altitude 350 ft. Drilled by N. C. Jannsen, 1943. Cased 1,006' x 22"-16", perforated 459-575 ft, and 627-647 ft. SWL 223 ft, August, 1943. Dd 91 ft at 325 gpm in 4 hrs.		
	sand	37	37
	sand and gravel, hard	25	62
	clay	45	107
	gravel	16	123
	clay	64	187
	clay, sandy	86	273
	gravel	8	281
	sand	38	319
	gravel, hard	6	325
	sand and clay, alternating strata	444	769
	clay and gravel	105	874
	clay, sandy	132	1006
24/2E-33J:	Manchester Water Dist. Altitude 35 ft. Drilled by W. D. Nicholson. Cased 185' x 12"-8"-6". Flowed 110 gpm August, 1960. Perforated 182-150 ft, 152-176 ft. Temperature 50°F.		
	sand, coarse, gravel, and "hardpan"	23	23
	clay, blue	17	40
	clay, blue, with pebbles	30	70
	sand, gravel and blue clay	30	100
	sand, blue clay	30	130
	clay, blue, and pebbles	33	166
	sand, pea gravel, with clay	2	168
	clay, blue	12	180
	clay, blue, with interbed of loose fine silty sand	5	185

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION G'-G"--continued		
24/2E-34P:	J. R. Anderson. Altitude 20 ft. Drilled by L. Stoican, 1951. Cased 141' x 6", perforated 133÷141 ft. Flowed, 1951. Dd 8 ft at 16 gpm, June, 1951.		
	dug well	50	50
	clay, blue	46	96
	sand, fine	16	112
	clay, blue	20	132
	"hardpan"	6	138
	gravel, coarse	3	141
23/2E-2B:	U.S. Army Corps of Engineers. Altitude 40 ft. Drilled by Service Hardware, 1952. 297' x 10", casing 290' x 6", gravel-packed. Screen 290-296 ft. SWL 39 ft, Sept., 1952. Dd 80 ft at 25 gpm. Considerable amount of gas present at several levels, including aquifer.		
	clay, blue	172	172
	silt, fine, with a little water	13	185
	clay, blue, with silt and fine sand streaks	106	291
	sand, fine, water-bearing	2½	293½
	clay with some gravel	3½	297
24/2E-25P:	Blake Island State Park. Altitude 160 ft. Drilled by Harbor Drilling Co., 1961. 190' x 6". SWL 145 ft. Dd 15 ft at 30 gpm bailed.		
	sand, silty and pebbles	10	10
	sand, brown, silty	18	28
	sand, dark, coarse, with seepage	15	43
	silt, blue	10	53
	clay, brown, green and blue, silty	22	75
	sand, brown, silty	23	98
	silt, yellow-brown, and gravel	18	116
	silt, yellow	14	130
	clay, yellow, silty	8	138
	"hardpan," silty sand and gravel	17	155
	sand, silty	5	160
	gravel, tight, and water	21	181
	"hardpan," blue and green	9	190
	SECTION H-H'		
23/2W-13H:	State Dept. of Institutions. Altitude 390 ft. Drilled by Stoican Drilling Co., 1960. 210' x 6". Casing 180' x 6", screened and perforated 170-180 ft. SWL 141 ft, November, 1950. Dd 15 ft at 125 gpm.		
	"hardpan," brown, and water-bearing sand and gravel, alternating 1-7 ft strata	195	195
	clay,yellow	8	203
	"hardpan," blue	4	207
	gravel and sand, water-bearing	1	208
	"hardpan," blue	2	210
23/1W-10D:	B. M. Short. Altitude 160 ft. Drilled by T. G. Philpott, 1949. Cased 116' x 6". SWL 17 ft, spring, 1950.		
	clay, sand, and some gravel	46	46
	clay, blue	10	56
	sand, fine, water-bearing	12	68
	clay, blue	1	69
	"quicksand"	15	84
	sand with gravel	22	106
	sand, medium-coarse	10	116

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION H-H'--continued		
23/1W-11J:	Kitsap Co. Airport. Altitude 430 ft. Dug by E. Kirkland 1938. Casing 150' x 48". SWL 52 ft, March, 1940. Dd $\frac{1}{2}$ ft at 75 gpm.		
	gravel and boulders	45	45
	sand, gray, hard	40	85
	gravel, water-bearing	27	112
	sand, hard	18	130
	gravel and sand	15	145
	sand, fine	5	150
23/1E-7D:	Sunny Slope Water Development Ass'n. Altitude 470 ft. Drilled by A. L. Nicholson, 1942. 219' x 8", cased to 199 ft, screened 199-219 ft. SWL 142 ft, Sept., 1952. Dd 28 ft at 110 gpm in $1\frac{1}{2}$ hrs.		
	soil	2	2
	"hardpan," with water-bearing sand (2 gpm) 24-26 ft, 50-53 ft	51	53
	"hardpan," clayey	17	70
	"hardpan," rocky	25	95
	sand, water-bearing (8 gpm)	7	102
	clay, yellow	10	112
	sand	23	135
	clay, yellow-blue	25	160
	clay, sandy	20	180
	gravel and sand, water-bearing ...	39	219
23/1E-20A:	Washington Congregation - Christian Conference. Altitude 520 ft. Drilled by T. G. Philpott. 170' x 8". Screened and perforated 160-170 ft. SWL 138 ft. Dd 15 ft at 50 gpm.		
	sand, gravel and clay	15	15
	"hardpan"	24	39
	sand, gravel, and clay, seepage..	2	41
	clay, yellow and sand	6	47
	sand, gravel, and clay, seepage..	2	49
	clay, yellow, and sand	13	62
	sand, clay, and gravel, seepage..	3	65
	clay, yellow, and sand	51	116
	sand and clay, water-bearing.....	4	120
	sand and gravel, water-bearing ...	20	140
	sand, clay, and gravel, water-bearing	9	149
	sand and gravel, water-bearing ...	21	170
23/1E-14A:	A. Sowa. Altitude 280 ft. Drilled by A. L. Nicholson. Cased 145' x 6". SWL 93 ft, Oct., 1950. Dd 7 ft at 22 gpm bailed.		
	sand	10	10
	sand, hard	20	30
	silt	45	75
	clay, yellow	5	80
	sand and clay	10	90
	sand	51	141
	sand and fine gravel	4	145
23/2E-17M:	C. L. Ferguson. Altitude 140 ft. Drilled by T. G. Philpott. 52' x 6". Screen 47-52 ft. SWL 11 ft, Sept., 1956. Dd 30 ft at 20 gpm.		
	soil	4	4
	sand, clay, and gravel	16	20
	gravel and sand, seepage	26	46
	sand and gravel, water-bearing ...	6	52

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION H-H'--continued		
23/2E-15N:	Tribune Publishing Co. Altitude 400 ft. Drilled by Nicholson, 1954. 139' x 10". Screened 134-139 ft. SWL 108 ft. Dd 8 ft at 36 gpm bailed.		
	"hardpan"	28	28
	sand and gravel	80	108
	sand, coarse, water-bearing	31	139
23/2E-22Q:	Z. J. Gonsecki. Altitude 40 ft. Dug and augered by Pichette and Morris, 1949. Cased 70' x 30".		
	clay, sandy	20	20
	clay, blue	17	37
	till, blue	2	39
	clay, blue	33	72
	SECTION H'-H"		
23/2E-25M:	---Barrantine. Altitude 340 ft. Drilled by L. C. Gaudio 1949. 100' x 6". Screen 85-90 ft. SWL 45 ft, July, 1949. Pumped 20 gpm.		
	sand and sandy clay	65	65
	sand, water-bearing 85-90 ft ...	35	100
23/3E-31H:	---Matsuda. Altitude 385 ft. Drilled by L. C. Gaudio, 1952. 342' x 8".		
	clay, blue, sandy, some rocks....	75	75
	"hardpan," and cemented sand and gravel	29	104
	sand and gravel, alternating strata.	35	139
	clay, blue, with streaks of fine sand	105	244
	sand, fine, and clay	8	252
	clay, blue, sandy	38	290
	sand, very fine, "heaving"	10	300
	clay, blue, sandy	42	342
	SECTION J-J'		
22/1W-10K:	Fern Lake Research Station. Altitude 220 ft. Drilled by Harbor Drilling Co., 1959. 55' x 6". SWL 32 ft, July, 1959. Dd 5 ft at 16 gpm, 1 hr.		
	soil	4	4
	"hardpan," brown	36	40
	sand, coarse, and gravel, seepage	12	52
	sand, dirty, fine	8	60
22/1W-11J:	Union Oil Co. Altitude 390 ft. Drilled by L. B. Richardson, 1949. Cased 352' x 6", casing perforated 280-290 ft. SWL 116 ft. Dd 1 ft at 16 gpm.		
	"hardpan"	23	23
	clay, yellow, and gravel	45	68
	clay, sandy	14	82
	sand, water-bearing	8	90
	clay, sandy, with some gravel strata	68	158
	gravel, cemented	10	168
	"hardpan"	20	188
	clay, sand, and gravel	12	200
	"hardpan"	5	205
	clay, red to gray, sandy	40	245
	sand, coarse, and gravel	2	247
	clay, brown, sandy, and gravel ..	13	260
	"hardpan"	18	278
	clay, sand and gravel	74	352

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION J-J'--continued		
22/1E-8H:	W. M. Nearhoff. Altitude 305 ft. Drilled by T. G. Philpott, 1948. 100' x 6", cased to 80 ft, screen 80-100 ft.		
	dug well	61	61
	sand, fine	19	80
	sand, coarse, and gravel	10	90
	sand, fine	10	100
22/1E-10D:	J. Granger. Altitude 305 ft. Drilled by Harbor Drilling Co., 1958. 97' x 6". SWL 50 ft, Oct., 1958. Dd 21 ft at 20 gpm.		
	dug well	48	48
	"hardpan"	29	77
	sand, brown, fine, water-bearing	18	95
	sand and gravel, water-bearing	2	97
22/1E-12D:	E. Knapp. Altitude 25 ft. Jetted by T. L. Ferguson. 353' x 2", cased to 343 ft. Flowing well, +105 ft. pressure head. Faint H_2S odor.		
	soil and blue clay	7	7
	sand and gravel, water-bearing	30	37
	clay, blue, and gravel	9	46
	clay, blue	13	59
	gravel and sand, water-bearing with artesian flow (3 lbs pressure)	19	78
	gravel, with sand and clay	19	97
	sand, fine, with clay	95	192
	clay, blue, hard	80	272
	sand, muddy	23	295
	sand, gray, fine, hard	3	298
	clay, blue, hard	45	343
	sand, water-bearing, artesian pressure 46 lbs	10	353
22/1E-1P:	A. D. Carter. Altitude 130 ft. Drilled by Stoican, 1959. 638' x 8"-6"-4". SWL 8 ft. Dd 40 ft at 50 gpm.		
	soil	2	2
	"hardpan"	43	45
	clay, blue	13	58
	clay, silty, stratified, water-bearing	4	62
	"hardpan" and blue clay	18	80
	"hardpan"	32	112
	clay, gray, hard, with silt and water-bearing sand	363	475
	clay, blue	155	630
	sand and gravel, water-bearing	8	638
22/2E-8E:	M. R. Mercer. Altitude 365 ft. Drilled 1949. 82' x 30". SWL 79 ft, November, 1949.		
	soil	4	4
	"hardpan"	4	8
	gravel	6	14
	sand	67	81
	gravel, water-bearing	1	82

Well Number	Material	Thickness (feet)	Depth (feet)
	SECTION J'-J"		
22/2E-13D:	H. Knight. Altitude 400 ft. Drilled by L. C. Gaudio. 172' x 6". SWL 155 ft. Bailed 10 gpm.		
	unknown	43	43
	sand, brown, and gravel streaks	57	100
	sand and gravel, cemented	15	115
	sand and gravel, cemented, with streaks of loose sand	43	158
	gravel, water-bearing, and clay	14	172
22/3E-16F:	Queen City Broadcasting Co. Altitude 25 ft. Drilled, 1941. 462' x 8". Perforated 440-460 ft. SWL 55 ft., Oct., 1941. Dd 60 ft at 40 gpm.		
	"hardpan"	27	27
	sand and blue clay	8	35
	clay blue	45	80
	sand and gravel	1	81
	shale, blue	201	282
	clay, sandy	93	375
	clay, blue	70	445
	gravel, water-bearing	15	460
	sand, water-bearing	2	462
22/3E-23D:	Wise Investment Co. Altitude 375 ft. Drilled by L. C. Gaudio, 1959. 382' (8" to 366', 6" to 380'). Casing perforated 365-380 ft. SWL 338 ft, Sept., 1959. Dd 17 ft at 30 gpm.		
	sand, gravel, and "hardpan"	15	15
	clay, sandy	5	20
	"hardpan"	50	70
	sand and gravel	9	79
	"hardpan," and boulders	18	87
	sand and gravel	69	156
	sand	17	173
	clay	6	179
	sand, water seepage	16	195
	clay, blue	90	285
	clay, blue, and gravel	9	294
	sand, fine	21	315
	sand and gravel	8	323
	"hardpan," blue and green	26	349
	clay	9	358
	"hardpan," sand and gravel	7	365
	sand and gravel	17	382
21/2E-1L:	R. K. Beymer. Altitude 315 ft. Drilled by E. E. Axelsen, 1958. 180' x 6", cased 170 ft, screen 170-180 ft. SWL 150 ft. Dd 15 ft at 20 gpm. Temperature 52°F.		
	soil	5	5
	gravel, sand and clay	30	35
	clay, blue	115	150
	sand, fine, water-bearing	30	180
22/3E-31J:	G. V. Fischer. Altitude 360 ft. Drilled by owner. Cased 493' x 8". SWL 162 ft. Dd 252 ft at 30 gpm. Temperature 50°F.		
	soil	13	13
	clay and sand	40	53
	sand and gravel	22	75
	clay, brown, and gravel	10	85

SECTION J'-J"--continued

22/3E-31J: Continued

Material	Thickness (feet)	Depth (feet)
sand and gravel, some clay	111	196
sand and seepage	20	216
clay blue	183	399
sand, gravel and clay, some water	41	440
sand, heavy with clay	30	470
clay and gravel, water-bearing	23	493

22/3E-32C: Bard & Howard. Altitude 300 ft. Drilled by Robinson & Roberts, 1961. 423' x 12", cased to 391 ft, screened 396-417 ft. SWL 237½ ft, July, 1961. Dd 80 ft at 128 gpm. Temperature 52½°F.

Material	Thickness (feet)	Depth (feet)
till	60	60
sand and gravel	60	120
sand, coarse to fine, water-bearing 270-275 ft	161	281
clay and sand, silty	142	423

22/3E-21J: A. A. Schmidt. Altitude 400 ft. Drilled by L. C. Gaudio, 1960. 518' x 6". SWL 378 ft. Yields 25 gpm.

Material	Thickness (feet)	Depth (feet)
"hardpan"	28	28
sand, gravel, and some clay	17	45
"hardpan"	51	96
sand and gravel, coarse	5	101
sand, with gravel	24	125
clay, blue	5	130
sand, clay, and gravel	32	162
"hardpan"	24	186
clay, brown, sandy, some gravel	32	218
sand, brown	7	225
clay and gravel	73	298
clay, blue, with some gravel and sand strata	112	410
sand, fine, and blue clay	35	445
sand, coarse, some gravel, water-bearing	73	518

22/3E-22C: A. Jensen. Altitude 360 ft. Drilled by J. A. Weber, 1915. 432' x 6". SWL 352 ft. Total Hardness: 85 ppm; Iron: 0.5 ppm; pH: 7.0.

Material	Thickness (feet)	Depth (feet)
"hardness"	50	50
clay, blue	50	100
sand, fine	331	431
sand and gravel	1	432

SECTION K-K'

22/1W-34G: D. Glenn. Altitude 5 ft. Drilled by Harbor Drilling Co., 1960. 81' x 6". SWL 5 ft., Oct., 1960. Dd 18 ft. at 30 gpm in 1 hr.

Material	Thickness (feet)	Depth (feet)
soil	3	3
clay, brown, hard	7	10
gravel, sandy, with clay and seepage	19	29
"hardpan" layers	23	52
sand	3	55
gravel, brown, and "hardpan," seepage	14	69
sand, brown clay and silt, and water-bearing gravel	10	79
"hardpan"	1	80
sand, coarse and gravel	1	81

SECTION K-K'--continued

21/1W-2C: Peninsula School Dist. No. 401. Altitude 40 ft. Drilled by Stoican Drilling Co., 1955. 158' x 8". Cased to 114 ft. SWL 84 ft, April, 1955. Dd 33½ ft at 35 gpm. Temperature 48°F.

Material	Thickness (feet)	Depth (feet)
sand and clay	20	20
"hardpan"	55	75
sand, fine	7	82
sand and gravel, water-bearing	6	88
clay and sand	9	97
sand and gravel	25	122
clay	36	158

22/1W-36R: G. Brown. Altitude 40 ft. Drilled by Harbor Drilling Co., 1955. 47' x 6". SWL 20 ft, Oct., 1955. Dd 10 ft at 10 gpm.

Material	Thickness (feet)	Depth (feet)
soil	12	12
sand and gravel	18	30
clay, blue	15	45
sand and gravel, water-bearing	1	46

22/1E-32P: R. Sherwin. Altitude 30 ft. Drilled by Harbor Drilling Co., 1958. 120' x 6". SWL 29 ft. Dd 34 ft at 15-20 gpm.

Material	Thickness (feet)	Depth (feet)
soil, sand, gravel and brown "hardpan"	40	40
"hardpan," blue	5	45
sand and gravel, water-bearing	12	67
sand, brown, fine, water-bearing	53	120

21/1E-10C: McDonald Realty Co. (Raft Island). Altitude 120 ft. Drilled by Harbor Drilling Co., 1959. 307' x 8", screened 302-307 ft. SWL 145 ft, Nov., 1959. Dd 13 ft at 45 gpm, bailed. 60 gpm capacity pump.

Material	Thickness (feet)	Depth (feet)
"hardpan," gravelly	15	15
sand and clay	32	47
clay, brown to blue, with some silt strata	175	222
sand, silty, water-bearing	3	225
clay, gray, blue, and white	12	237
sand, blue, and gravel, water-bearing	1	238
sand, gravel, clay and "hardpan," with water	14	252
sand, water-bearing	55	307

21/1E-2N: Mrs. F. B. King. Altitude 60 ft. Drilled by Harbor Drilling Co., 1954. 160' x 6". SWL 35 ft, June, 1954. Dd 100 ft at 10 gpm.

Material	Thickness (feet)	Depth (feet)
soil	5	5
"hardpan," sandy	10	15
sand, brown, water-bearing	11	26
clay, blue	3	29
sand, fine, hard, water-bearing	12	41
clay, blue	117	158
sand, hard, and gravel, water-bearing	2	160

SECTION K-K'--continued

21/2E-6N: W. Nord. Altitude 300 ft. Drilled by Harbor Drilling Co., 1955. 203' x 6". SWL 176 ft, July, 1955. Dd 5 ft at 10 gpm.

Material	Thickness (feet)	Depth (feet)
soil	3	3
"hardpan," sandy	17	20
sand	25	45
sand, water-bearing	5	50
clay, blue	40	90
"hardpan" and blue clay	10	100
sand, brown, and gravel	80	180
"hardpan"	5	185
gravel and coarse sand, water-bearing	19	204

21/2E-8C: Town of Gig Harbor. Altitude 60 ft. Drilled by Peter Sylte, 1951. 375' x 18" to 83 ft, gravel-packed 10" inner casing to 73 ft. Perforated 260-265 ft. Dd 31 ft at 340 gpm (SWL not given). Well pumped at "maximum rate of 550 gpm."

Material	Thickness (feet)	Depth (feet)
soil	3	3
sand, gravel, and clay strata, 3-4 ft each	46	49
"hardpan"	9	58
"hardpan," sand, gravel and silt	202	260
gravel, cemented	3	263
gravel, clay, "hardpan" and silt	112	375

SECTION K'-K''

21/2E-1L: R. K. Beymer. Altitude 315 ft. Drilled by Axelson. 180' x 6". Casing perforated 170-180 ft. SWL 150 ft. Dd 15 ft. at 20 gpm.

Material	Thickness (feet)	Depth (feet)
soil	5	5
gravel, sand and clay	30	35
clay, blue	115	150
sand, fine, water-bearing	30	180

22/3E-31J: G. V. Fischer. Altitude 360 ft. Drilled by owner. 493' x 8". Cased to 481 ft., open hole below. SWL 162 ft. Dd 252 ft. at 30 gpm. Temperature 50°F. Hardness as $CaCO_3$: 180 ppm, iron 0.3 ppm, pH 7.5, low in chloride.

Material	Thickness (feet)	Depth (feet)
soil	13	13
clay, sand and gravel	183	196
sand, some water	20	216
clay, blue	183	399
sand, gravel, and clay, some water	41	440
sand, heavy, with clay	30	470
clay, some gravel, water-bearing	23	493

22/3E-32C: Bard and Howard. Altitude 300 ft. Drilling supervised by Robinson and Roberts, 1961. 423' x 12". Cased to 391. Perforated 371-396 ft. Screened 396-417 ft. SWL 237½ ft. Dd 80 ft. at 128 gpm. Temperature 52½°F.

Material	Thickness (feet)	Depth (feet)
till	60	60
sand and gravel	60	120
sand, fine to coarse	161	281
clay and sand, silty	142	423

SECTION K'-K''--continued

22/3E-21J: A. A. Schmidt. Altitude 400 ft. Drilled by L. R. Gaudio. 518' x 6". Cased to 514 ft. No perforations. Open hole below 514 ft. SWL 378.25 gpm pump.

Material	Thickness (feet)	Depth (feet)
"hardpan"	28	28
sand, gravel and clay	17	45
"hardpan"	51	96
sand, gravel and clay	66	162
"hardpan"	24	186
sand, gravel and clay	122	308
clay, blue, sandy	52	360
sand and gravel	16	376
sand and clay	138	514
sand, coarse, water-bearing, some gravel	4	518

22/3E-22C: (See Section J'-J'')

SECTION L-L'

21/1W-34L: H. W. Schwortz. Altitude 225 ft. Drilled by Harbor Drilling Co., 1959. 192' x 6". Screened 187-192 ft. SWL 160 ft, August, 1959. No drawdown at 22 gpm bailed.

Material	Thickness (feet)	Depth (feet)
soil	8	8
"hardpan", sandy	13	21
sand and gravelly "hardpan"	147	168
sand, hard, and gravel, water-bearing	24	192

21/1W-36D: P. G. Raleigh. Altitude 65 ft. Drilled by Harbor Drilling Co., 1960. 297' x 8". Cased 279' x 8", screened 191-201 ft. SWL 66 ft, July, 1960. Dd 71 ft at 50 gpm, bailed 4 hrs.

Material	Thickness (feet)	Depth (feet)
sand, gravel, and "hardpan"	33	33
sand, brown, water-bearing 84-122 ft	144	177
sand, blue, fine, water-bearing, with several alternating strata of blue clay	120	297

21/1E-28D: ---Overby. Altitude 30 ft. 58' x 6". SWL 28 ft, August, 1959. Dd 6 ft at 22 gpm.

Material	Thickness (feet)	Depth (feet)
"hardpan," gravelly	12	12
"hardpan," blue-gray	44	56
sand, coarse, and gravel, water-bearing	2	58

21/1E-28C: L. Shelton. Altitude 25 ft. Drilled by Harbor Drilling Co., 1958. 47' x 6". SWL 21 ft, August, 1958. Dd 7 ft at 15 gpm in 1 hr.

Material	Thickness (feet)	Depth (feet)
dug well	18	18
"hardpan," brown sand and gravel	13	31
"hardpan," brown, seepage	4	35
sand, brown, hard, with seepage	1	36
"hardpan"	2	38
sand and gravel, hard	9	47

Well Number	Material	Thickness (feet)	Depth (feet)

SECTION L-L'--continued

21/1E-22N: ---Johnson. Altitude 40 ft. Drilled by Harbor Drilling Co., 1959. 83' x 6". SWL 27 ft, June, 1959. Dd 22 ft at 18 gpm bailed in hr.

Material	Thickness (feet)	Depth (feet)
dug	27	27
"hardpan," gravelly	4	31
sand	4	35
"hardpan"	13	48
sand, gravel, with "hardpan"	2	50
"hardpan," brown	12	62
sand and gravel, water-bearing	2	64
"hardpan"	9	73
sand and gravel, water-bearing	5	78
"hardpan," blue	4	82
sand and gravel, water-bearing	1	83

21/1E-24J: ---Bennett. Altitude 10 ft. Drilled by Harbor Drilling Co., 1959. 124' x 6". Flowed, July, 1959. Dd 50 ft at 20 gpm bailed.

Material	Thickness (feet)	Depth (feet)
soil	3	3
"hardpan," brown	22	25
sand, brown, with some gravel	66	91
clay, blue	25	116
sand and gravel, water-bearing	8	124

21/2E-20L: E. M. Antonson. Altitude 110 ft. Drilled by Harbor Drilling Co. 84' x 6". SWL 58 ft. Dd 10 ft at 14 gpm.

Material	Thickness (feet)	Depth (feet)
"hardpan"	20	20
sand, brown	50	70
sand, clean	10	80
sand, coarse, and gravel	4	84

21/2E-21C: Westbridge Estates Water Co. Altitude 210 ft. Drilled by Harbor Drilling Co. 255' x 8", casing perforated 250-255 ft. SWL 195 ft. Dd 7 ft at 35 gpm.

Material	Thickness (feet)	Depth (feet)
soil	3	3
"hardpan," and boulders	28	31
sand, brown, and "hardpan"	67	98
sand, gravel, and "hardpan"	59	157
sand, brown	33	190
sand, brown, fine, water-bearing	47	237

SECTION M-M'

20/1W-27K: L. A. Dunn. Altitude 200 ft. Drilled by Stoican Drilling Co., 1961. 216' x 6", perforated 206-216 ft. SWL 185 ft, April, 1961. Dd 15 ft at 25 gpm. Temperature 52°F.

Material	Thickness (feet)	Depth (feet)
soil	3	3
"hardpan," brown	71	74
sand	1	75
clay, blue	24	99
peat	1	100
clay, blue	8	108
sand, black, fine, clay and silt, stratified	8	116
peat	7	123
sand and blue clay, stratified	17	140
peat, wood, sand, silt, and blue clay	18	158
"hardpan", brown	44	202
sand, brown, fine, water-bearing	3	205
sand, brown, coarse, water-bearing	11	216
clay, blue		at 216

SECTION M-M'--continued

20/1W-24F: J. Conboy. Altitude 75 ft. Drilled by Tacoma Pump Co., 1947. Cased 285' x 8". SWL 60 ft, May, 1947. Dd 110 ft at 33 gpm.

Material	Thickness (feet)	Depth (feet)
"hardpan"	70	70
sand, water-bearing	30	100
clay and sand	60	160
sand, water-bearing	20	180
clay, sand, and gravel	105	285

20/1W-11C: Peninsula School Dist. No. 401. Altitude 220 ft. Drilled by Stoican Drilling Co., 1955. Cased 224' x 8". SWL 214 ft, March, 1955. Dd 6 ft at 100 gpm.

Material	Thickness (feet)	Depth (feet)
sand and clay	58	58
gravel, cemented	39	97
sand and gravel	41	138
sand	8	146
sand and gravel	16	162
sand, fine	20	182
sand, gravel, some clay	16	198
sand, clean, and gravel	26	224

21/1W-34L: (See Section L-L')

21/1W-23M: K.P.S.C. Grounds. Altitude 220 ft. Drilled by Harbor Drilling Co., 1956. 75' x 6". SWL 55 ft, January, 1956. Dd 12 ft at 12 gpm in 1 hr.

Material	Thickness (feet)	Depth (feet)
soil	2	2
"hardpan," brown	33	35
sand, brown, and gravel, water-bearing	18	53
"hardpan," clay	12	65

22/1W-36R: (See Section K-K')

22/1E-30H: ---Colbath. Altitude 230 ft. Drilled by Harbor Drilling Co., 1960. 196' x 4". SWL 155 ft, Sept., 1960. Dd 4 ft at 15 gpm.

Material	Thickness (feet)	Depth (feet)
sand and gravel, seepage 170-175 ft	175	175
sand, brown, water-bearing	11	186
sand, coarse, and gravel, water-bearing	10	196

22/1E-8H: (See Section J-J')

23/1E-27Q: Mrs. E. R. Stevens. Altitude 430 ft. Drilled by Tacoma Pump Co., 1946. Cased 100' x 6". SWL 82 ft. Supplies 3 families. Chloride: 5 ppm; Hardness as $CaCO_3$: 35 ppm.

Material	Thickness (feet)	Depth (feet)
soil	5	5
"hardpan"	27	32
gravel and sand, stratified	68	100

23/1E-14A: (See Section H-H')

23/1E-12E: G. L. Bohnstedt. Altitude 310 ft. Drilled by A. L. Nicholson, 1946. Cased 318' x 6". SWL 25 ft, 1946.

Material	Thickness (feet)	Depth (feet)
sand	83	83
clay, yellow	2	85
sand, water-bearing	105	190
clay, blue	127	317
sand, black, water-bearing	1	318

Well Number	Material	Thickness (feet)	Depth (feet)

SECTION M'-M"

23/1E-1E: R. Freese. Altitude 330 ft. Drilled by Osborn Drilling Co., 1947. 136' x 6", perforated 135-138 ft. SWL 27 ft, Sept., 1947. Dd 50 ft at 30 gpm.

Material	Thickness (feet)	Depth (feet)
clay	15	15
sand	5	20
"hardpan" (cemented gravel)	84	104
sand, fine	8	112
shale, blue	22	134
sand and gravel	2	136

24/1E-25E: (See Section G'-G")

24/1E-23B: U.S. Navy. Altitude 20 ft. Drilled by Joslyn and Gibson, 1895. 748' x 6"-4½". Flowing well, 1895.

Material	Thickness (feet)	Depth (feet)
no record	300	300
sand, black, fine	253	553
sand and clay, hard	14	567
gravel, cemented	10	577
sand, black, fine, water-bearing	171	748

24/1E-12E: City of Bremerton. Altitude 260 ft. Drilled by International Water Supply, Ltd., 1942. 914' x 8". SWL 73.3 ft, Nov., 1942. Yields 25 gpm.

Material	Thickness (feet)	Depth (feet)
sand, clay and gravel	13	13
clay, blue, with some sand, boulders	179	192
sand, coarse, and gravel, water-bearing	10	202
sand, fine	18	220
sand and shale	30	250
shale, blue, hard, sandy	374	624
shale, gray	89	713
shale, gray, and boulders	29	742
unrecorded	172	914

24/1E-2A: E. C. Enhelder. Altitude 330 ft. Drilled by A. L. Nicholson, 1945. Cased 333' x 6".

Material	Thickness (feet)	Depth (feet)
dug, no record	15	15
sand	82	97
clay, blue, and fine sand	236	333

25/1E-25M: P. W. Crane. Altitude 240 ft. Drilled by A. L. Nicholson. 156' x 6". Perforated 79-125 ft. SWL 70 ft. Dd 5 ft at 50 gpm.

Material	Thickness (feet)	Depth (feet)
sand, brown	43	43
"hardpan"	6	49
sand, water-bearing, "5 gpm"	1	50
"hardpan," with seepage	80	130
clay, blue	8	138
gravel and sand, water-bearing	2	140
peat	6	146
clay, blue, and sand	10	156

25/1E-23K: (See Section E-E')

SECTION M'-M"--continued

25/1E-10J: O. Ringress. Altitude 245 ft. Drilled by T. G. Philpott, 1950. Cased 225' x 6". SWL 60 ft, Nov., 1950.

Material	Thickness (feet)	Depth (feet)
dug, "hardpan" and sand	50	50
sand, water-bearing	11	61
clay, blue	8	69
clay, some sand and water	9	78
sand, water-bearing	78	156
sand and gravel, cemented, hard (till?)	66	222
sand, water-bearing	3	225

26/1E-36N: (See Section D-D')

26/1E-25C: A. E. Johanson. Altitude 200 ft. Drilled by C. Ruby, 1946. Cased 155' x 6".

Material	Thickness (feet)	Depth (feet)
soil and ?	8	8
clay, blue	146	154
gravel, water-bearing	1	155

26/1E-13C: (See Section C-C')

27/2E-28C: (See Section B-B')

27/2E-17J: D. Williams. Altitude 25 ft. Drilled by C. Ruby, 1950. Cased 66' x 6". SWL 22 ft, Sept., 1950.

Material	Thickness (feet)	Depth (feet)
clay, sandy	25	25
clay, blue	32	57
sand, coarse	9	66

27/2E-17A: R. Walgram: Altitude 45 ft. Drilled by C. Ruby, 1950. Cased 142' x 6". SWL 11 ft. Water reported of poor quality.

Material	Thickness (feet)	Depth (feet)
clay, sandy	25	25
clay, blue	32	57
sand, coarse	9	66

27/2E-7A: Pope and Talbot, Inc. Altitude 60 ft. Drilled by Robinson & Roberts, 1957. Cased 169' x 10"-8", perforated 159-169 ft. SWL 56 ft. Dd 66 ft at 100 gpm. Temperature 51°F.

Material	Thickness (feet)	Depth (feet)
sand	6	6
clay, sandy	19	25
"hardpan"	4	29
clay, blue, with sand and gravel strata	153	182

27/2E-6Q: Pope and Talbot, Inc. Altitude 40 ft. Drilled by Gaudio Drilling Co. 267' x 10". Well abandoned.

Material	Thickness (feet)	Depth (feet)
sand and clay	10	10
sand, gravel, and clay	4	14
clay, blue	2	16
sand, gravel and clay ("hardpan")	54	70
blue clay, with gravel and sand strata	84	154
gravel, cemented, with shells	72	226
silt and gravel	8	234
shale, sandy, with pebbles	33	267